JUNE 1956 Vol. 18 No. 7

MINING WORLD

High Flying Helicopters For Cascade Drillers

How NYAC Dredges Alaskan Gold

Graphite Mining in Austria
Page 56

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NEARLY 7000 TROUBLE-FREE HOURS— "THE BEST ENGINES MADE"

SAM J. SHEPLER, *mine superintendent*
National Gypsum Company, Sun City, Kan.

This Plymouth mine locomotive, powered by a CAT* D315 Diesel, hauls 16 cars—each loaded with 3 to 3½ tons of gypsum—from the mine to the crusher at National Gypsum Company, Sun City, Kan. Haul distance is about a mile each way. This sturdy Caterpillar Engine, a veteran of 6922 hours, works 40 hours a week the year around. It and another D315-powered locomotive handle the mine's 1000-ton daily output.

The two Caterpillar D315s have a combined total of 10,469 hours. Fuel consumption averages an economical 1 to 1½ gallons per hour each. "Our D315s have given us no trouble, and year in and year out we have spent little money to operate them. In my opinion they're the best engines made," says Sam J. Shepler, mine superintendent. Mr. Shepler also likes Caterpillar Engines' absence of gas fumes, and the clean exhaust that makes scrubbers practical for underground work.

Cat Engines have a clean exhaust because they completely burn all the fuel. This clean burning results from 4-cycle efficiency and large orifice precombustion-type fuel systems. All Caterpillar Diesels are compact, heavy-duty engines designed for ease and simplicity of installation. They're available for repowering existing equipment—and for installation in new machines.

There's a Caterpillar Engine built to do more work for *you* at lower cost. See your Caterpillar Dealer soon—and rely on him for skilled service and factory parts.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

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MODERN HEAVY-DUTY POWER

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

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ON THE COVER: Special polygonal timber sets are used in areas of high rock pressure at the Austrian graphite mine of Graphitbergbau, Kaisersberg, Franz Mayer-Melnhof and Company.

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(Courtesy Climax Molybdenum Co.

Single blast of Du Pont "NITRAMON"® breaks 750,000 tons of ore at Climax, Colorado

On October 2, 1955, the Climax Molybdenum Co. brought down an estimated 750,000 tons of ore at its Climax, Col., mine when it collapsed a section of huge arch that had resisted earlier blasting efforts. 81,614 pounds of Du Pont "Nitramon"—the safest blasting agent known—were loaded in three coyote adits.

Climax uses "Nitramon" in mammoth blasts like this because its combination of maximum safety and power is ideal for coyote work. With "Nitramon," crews can safely use electric lighting to speed loading. And they needn't worry about headaches—"Nitramon" contains no nitroglycerin.

"Nitramon" cannot be exploded by shock, friction or rifle bullets. It should be detonated with a special insensitive "Nitramon" Primer, which must be initiated with "Primacord."

FOR FURTHER INFORMATION on this hard-hitting blasting agent, contact the Du Pont representative in your area or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

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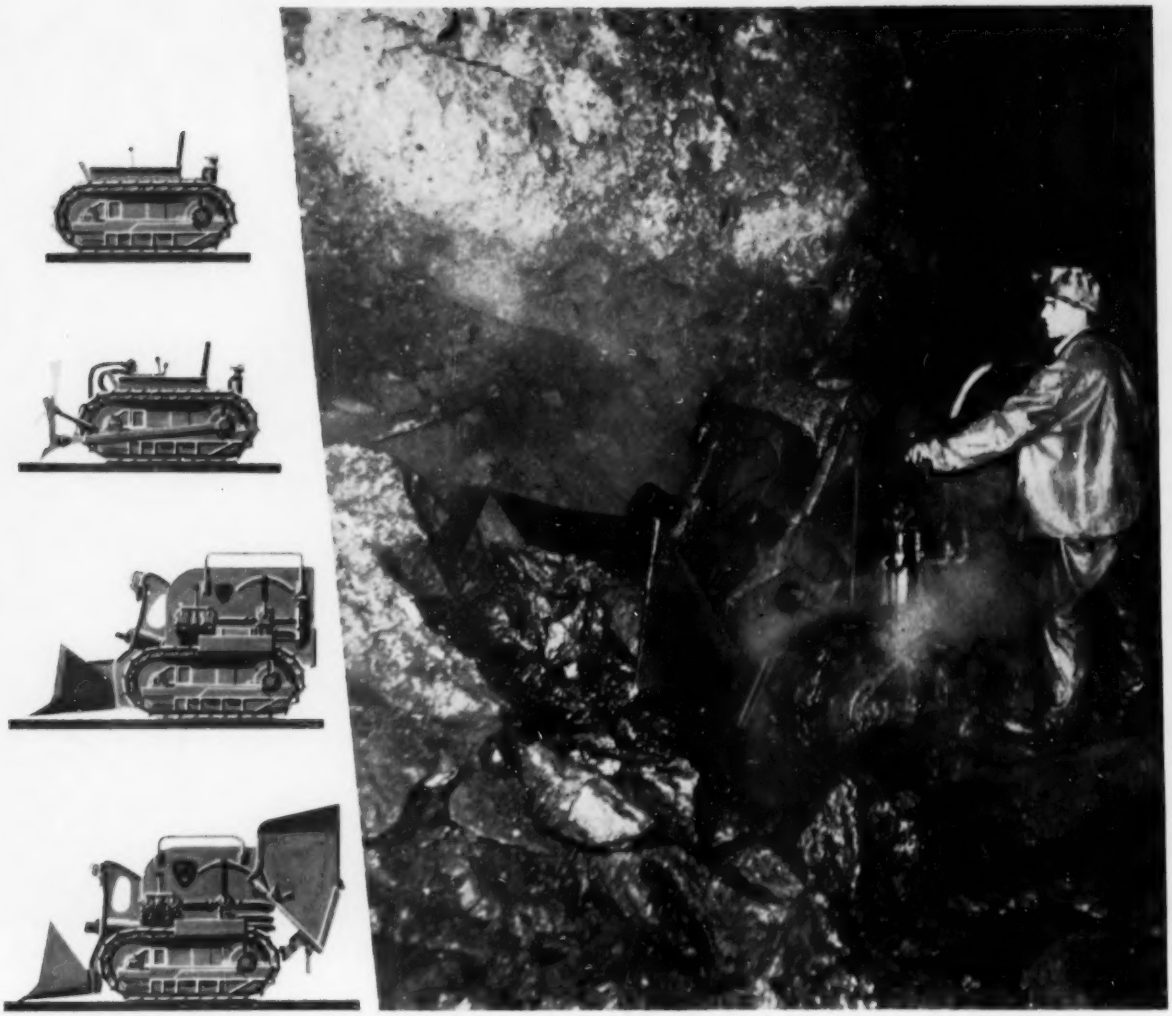


Fast, Economical EIMCO 630's Introduce New Era Underground

Eimco 630's designed and built to Eimco's traditionally heavy-duty standards, are being used as tractors, excavators, bulldozers, jumbos and many other mining tools to speed up development, production, shaft sinking or other operations that tend to reduce costs.

New records have been established in all phases of mining where the 630 Eimcos have been used. Operators have said "It's working out much better than we had ever expected." The 630 is ideal for excavation and loading in large stopes and is small enough to be taken up man ways for work in remote areas of the mine.

The Eimco 630 has many new design features; some of them are: all alloy steel construction, air or AC electric power, independent track control, track oscillation with all attachments, easy accessibility and heavy shafts with oversize anti-friction bearings.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-200

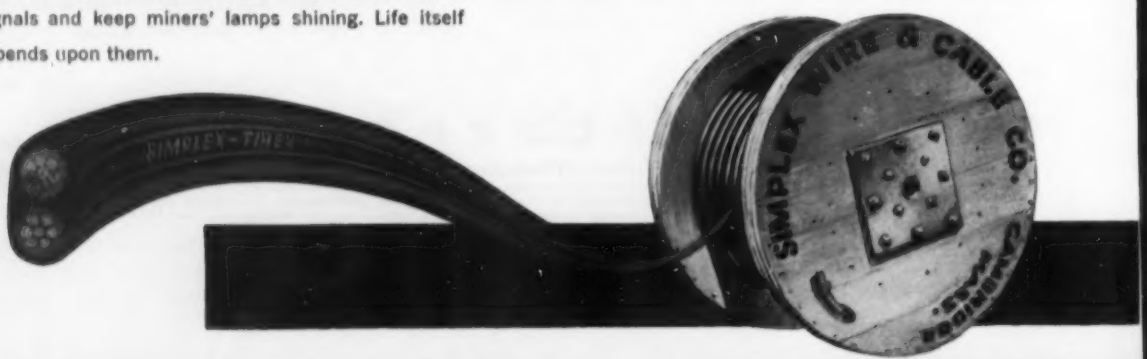
Putting electricity where it's needed:

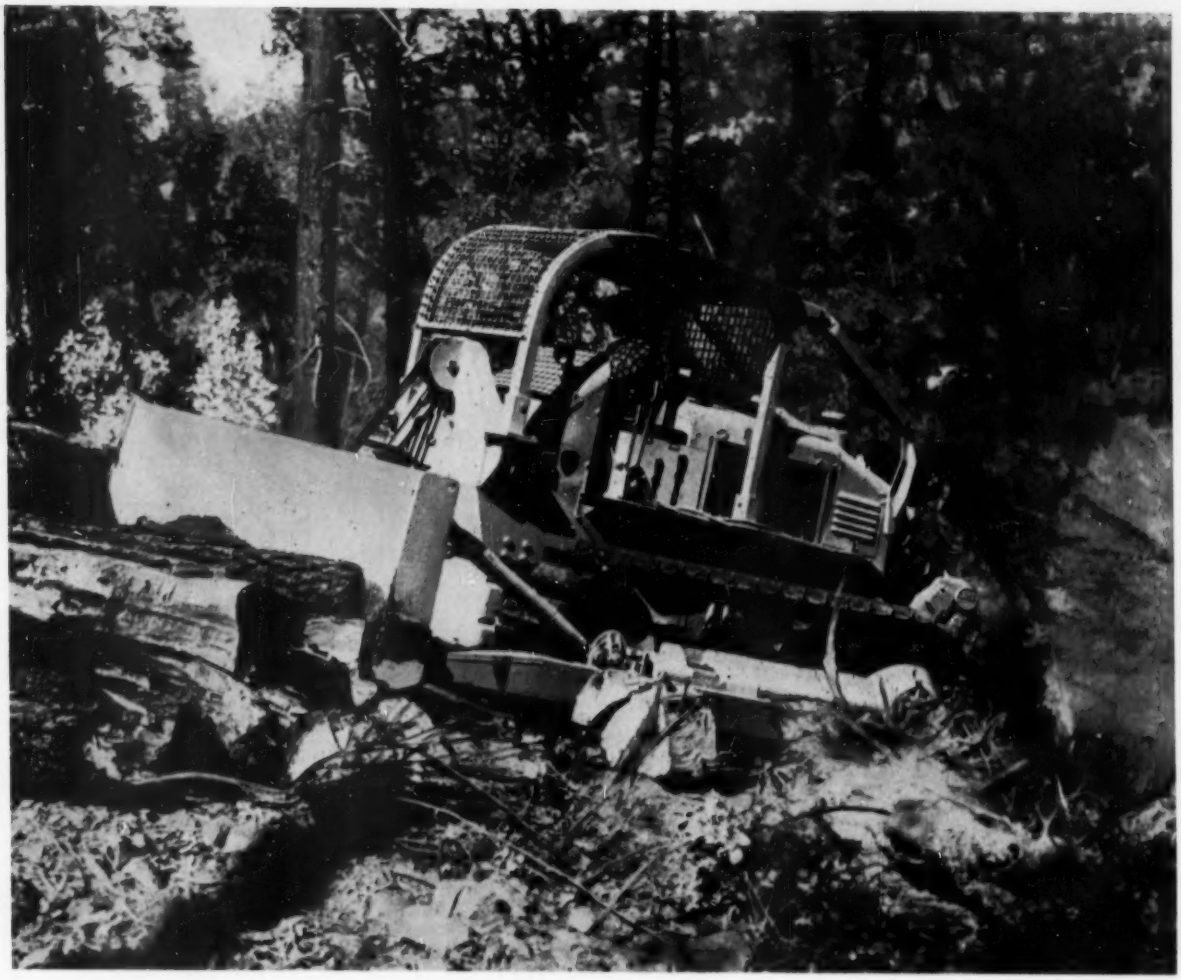
Wherever man's energy is being spent in industry, man must use the power of electricity. Mining men demand that this power be delivered efficiently and SAFELY.

This insistence on top quality and top performance explains the tremendous popularity of Simplex-TIREX cords and cables. You see them in and around mines everywhere, performing dependably in a variety of applications. These cords and cables pour energy into drills, loaders, cutters, feeders, shuttle cars and locomotives. They transmit track signals and keep miners' lamps shining. Life itself often depends upon them.

Simplex-TIREX performs ruggedly,—even under the most trying conditions. Featuring CURED-IN-LEAD SELENIUM NEOPRENE ARMOR, they are engineered to resist abrasion, oil, flame and water.

Simplex-TIREX bears the molded markings of BM and P-101 on its jackets and is made in a wide range of sizes. Be sure to specify Simplex-TIREX when you order cords and cables. **SIMPLEX WIRE & CABLE CO.,** 79 Sidney St., Cambridge 39, Massachusetts.





COMPETITIVE TESTS SHOW EIMCO ADVANTAGES

Recent competitive tests have shown again the superiority of Eimco equipment.

Tests conducted in timber and foothill brush were made to determine dozer earth moving and fire line construction ability.

Over a five day period numerous runs were made by impartial crews and judges with experienced operators using an Eimco 105 and a conventional tractor both equipped with bulldozers.

When final results were computed, the Eimco rated "Best" with 33% more dozer earth moving and 11% more fire line construction and the Eimco had also earned operator confidence because it was more stable, easier to operate and would back up 30% steeper grade (the usual method of getting out of trouble).

The features on the Eimco that contributed to its success in the test and outstanding performance under most difficult conditions were: front operator position, better visibility, rear engine mounting, better weight distribution, torque converter, better location and protection of cooling system, better maneuverability (through independent track control) simple controls which eliminate clutch pedals, steering clutch levers, master clutch and manual gear shift lever.

Eimco tractors with bulldozer or excavator attachments are demonstrating their superiority of performance and economy of operation on highways, construction jobs, in mines and in numerous other applications. See the Eimco Tractor before you make any decision on new equipment.

THE EIMCO CORPORATION

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EIMCO

B-302

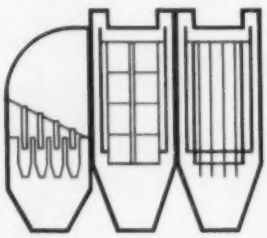
The industry's most experienced organization in dust, fume and fly ash recovery

—as near as your telephone!

Because the Western Precipitation Corporation stands alone in its years of continuous leadership in the complex science of recovering suspensions from industrial gases, Western Precipitation installations, quite naturally, are recognized throughout the world as the best obtainable. . .

■ Almost a half-century ago—in 1907 to be exact—Western Precipitation installed the first commercial application of the now-famous Cottrell Electrical Precipitator—and has more know-how, more varied experience and application background in world-wide installations in this type of equipment than any other organization, domestic or foreign.

■ Many years ago Western Precipation was first again with the multiple small-diameter tube type of cyclonic collector—the type with higher centrifugal forces for greater recovery efficiencies. And through the years, Western Precipitation engineers have continuously led in new advancements, new refinements in the *mechanical* recovery field as well as in *electrical* recovery methods.



■ Western Precipation was the first to combine Electrical and Mechanical recovery advantages in one compact, coordinated system—the CMP (Combination Multiclone—Precipitator) Unit. This equipment, offering almost constant collection efficiency despite varying gas volume, requires years of experience in both electrical and mechanical recovery methods for proper operating "balance".

. . . only Western Precipitation has had such extensive experience in basic recovery methods!

These are only a few of the many important reasons why a Western Precipitation installation is recognized as the best obtainable. This unequalled know-how is quickly available throughout the major industrial areas of the United States and Canada from strategically-located, fully-staffed offices and field representatives, as shown at right. There's one as near as your telephone.

So before you finalize any dust, fume or fly ash recovery plans, be sure to find out the vital *extra* advantages offered by Western Precipitation Corporation!

For literature describing Western Precipitation's unique background of experience and advancements, phone, wire or write our nearest office.

COTTRELL Electrical Precipitators

MULTICLONE Mechanical Collectors

CMP Combination Units

DUALAIRE Reverse-Jet Filters

HOLO-FLITE Processors

Western Precipitation Corporation

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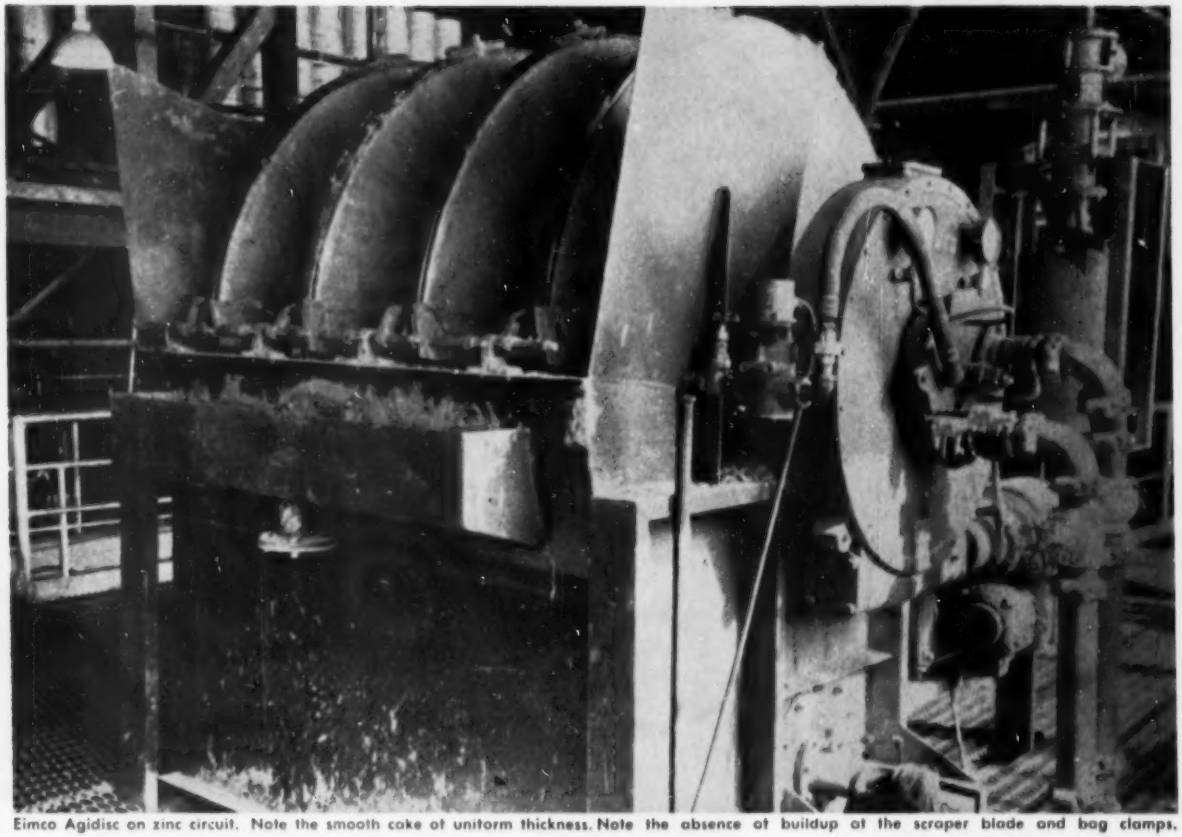
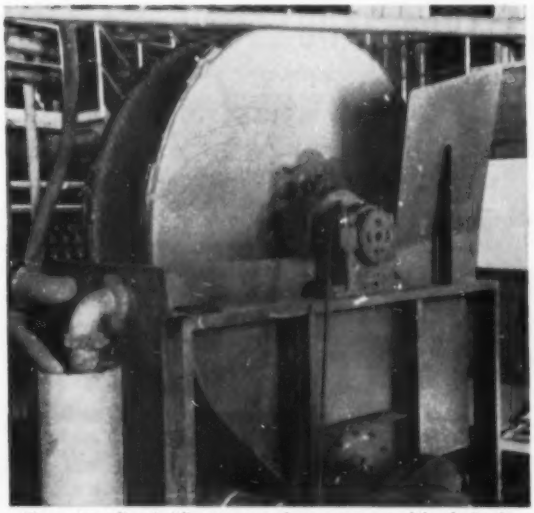


Eimco Agidisc on zinc circuit. Note the smooth cake of uniform thickness. Note the absence of buildup at the scraper blade and bag clamps.

LOW MOISTURE AT HIGH ALTITUDES WITH EIMCO AGIDISC FILTERS



Eimco two disc Agidisc type used on copper and lead circuits.

Metallurgical concentrates being dewatered in a mill at approximately 9,000 ft. elevation are handled on three Eimco Agidisc filters, one each for lead, copper and zinc circuits.

The ore is ground to 50%—200 mesh and dewatered on the Agidiscs equipped with snap blow device to provide maximum cloth life and tonnage.

Most important is the moisture content of these dewatered concentrates discharged from the filters at this altitude. The monthly average runs; lead 8.0%, copper 9.5% and zinc 10.3%.

Operation of these filters is best expressed in the words of the Superintendent of the mill who says, "their (Eimco Agidiscs) operation is so trouble-free that we have paid no attention to them and feel that when we get time from the other parts of the circuit we will undoubtedly be able to improve the present moistures."

Your problem in dewatering a metallurgical concentrate can be solved by Eimco's filtration engineers. Call on Eimco for the experience and facilities to solve your problem.

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B-204

Quality-built for dependable, high-output stripping and loading...

the big, rugged LIMA Type 2400

It takes a big, rugged machine like the Type 2400 to give you fast, dependable, high-output stripping and loading service. This heavy-duty 6 yd. shovel is quality-built by Lima to stay on the job, deliver peak operating performance on the tough assignments. It's easily convertible for dragline operation, too.

Air operated clutches make the Type 2400 easy to handle. Wide, long crawlers give it plenty of bearing area for stability and maneuverability on soft footing. Tandem mounted drums give maximum cable capacity. These plus Lima's quality "extras" (see right) have made the Type 2400 a hands-down favorite with users around the world.

Get the full story on the quality-built Type 2400 today. See your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-type dirt seal rings and retainers in crawler rollers.
2. Moving parts are flame or induction hardened for longer life.
3. Two-shoe swing and propel clutches; air control.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (standard equipment).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (½ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

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Cable Address: LIMASHOVEL, Lima, Ohio, U.S.A.

You never run out of uses for a CAT* NO. 212

This Caterpillar No. 212 Motor Grader is equipped with a 40-foot crane which serves as a drill "jumbo." It is one of a number of Caterpillar machines in the underground mine of American Zinc-Lead & Smelting Co. at Picher, Okla. Four-cycle Caterpillar Diesels are ideal for this kind of work, giving efficient combustion and clean exhaust due to their trouble-free fuel injection systems. With properly designed exhaust scrubbers, Caterpillar Engines produce so little carbon monoxide, carbon dioxide and obnoxious gases that they are well within Bureau of Mines' limits.

The Caterpillar No. 212 has other features that are important in mining work, too. Like all other Caterpillar Motor Graders it is built—not merely assembled—by a single manufacturer. This means that engine, blade capacity and working speed are carefully matched for maximum efficiency and long work life. And it means a single, dependable source for parts and service: your Caterpillar Dealer.

Tubeless tires are now available on the No. 212 at no extra cost. They eliminate an estimated 80% of down time caused by tires, and last longer and are easier to service than ordinary tires.

Your Caterpillar Dealer has full information on the big No. 12, the No. 112, and the compact No. 212 Motor Graders. Ask him for a demonstration of the fast-acting controls, excellent operator visibility and other features that make Caterpillar Motor Graders the best in *any* mine.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Illinois, U.S.A.

CATERPILLAR*

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99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

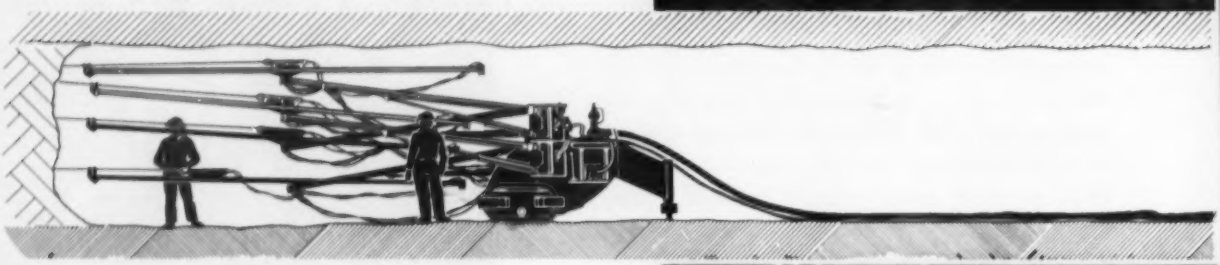
"GISMO Method continues to startle the Industry"... says E. & M. J.

● In a feature article in its March issue, Engineering & Mining Journal announced: "The Gismo, which was first developed as a self-loading cost-cutting transport . . . is more versatile than ever. A full string of mine cars now can be ramp-loaded in sequence, thus expanding the unit's earlier function of speeding the drilling-mucking-loading cycle." The article reveals how this revolutionary system has now proved a tremendous cost-cutting method for development and tunnel work. Reprints will be gladly furnished on request.

With the Gismo System and Ramp Car combination, and with a greatly reduced crew of men, a new, low cost is apparent for development and tunnel work.

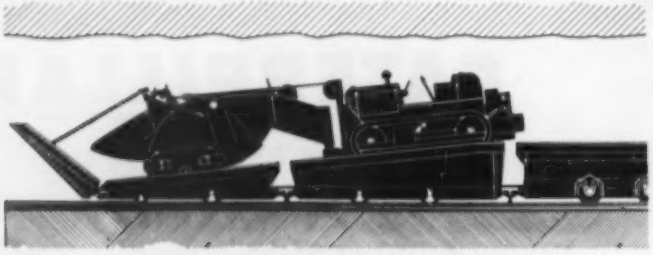
In equipment, you will have a Gismo Drilling Jumbo, a Gismo Self-Loading Transport, a tractor, an incline ramp, any required number of cars, a locomotive and track. That's all! Your work cycle is simple, as shown by the mechanical and photographic illustrations below. Rails are extended, of course, as work progresses.

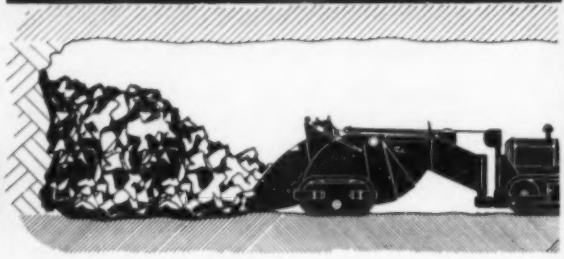
When development work is completed, your Gismo Drilling Jumbo goes into production. The Gismo transport mucks it out. The cars and locomotive transport the ore, usually from surge pocket. For story on the Gismo Method in production work, let us send you a reprint of Mining World's March issue article—"Standard Uranium Mechanizes with Gismos" by Stanley H. Dayton, Associate Editor. *Sanford-Day Iron Works, Inc., Telephone 3-4191, Knoxville, Tennessee.*



1. The Gismo drilling Jumbo moves in to drill out a round with 4 drills operating simultaneously.

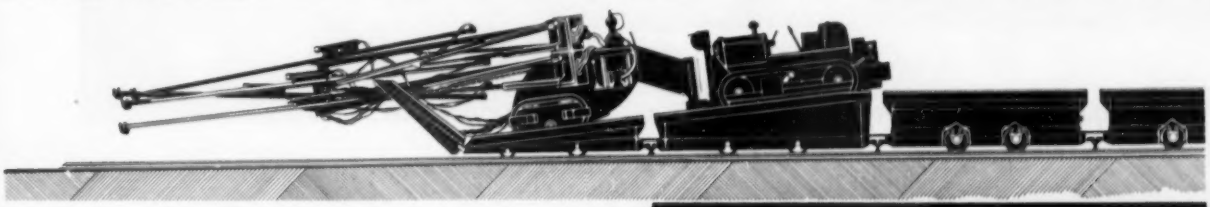
3. In the meantime, rock has been blasted at the previously drilled face and Gismo self-loading transport is brought in for mucking and transporting rock.



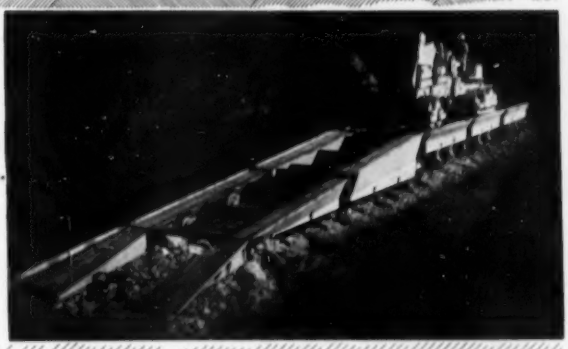


The Gismo Assembly is equipment designed and built for years of rugged service.

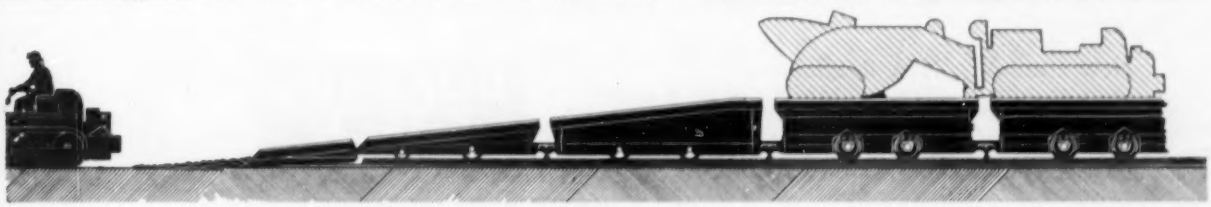
SANFORD-DAY



2. With drilling complete, Gismo Jumbo pulls out from face to car ramp for transfer to another heading.

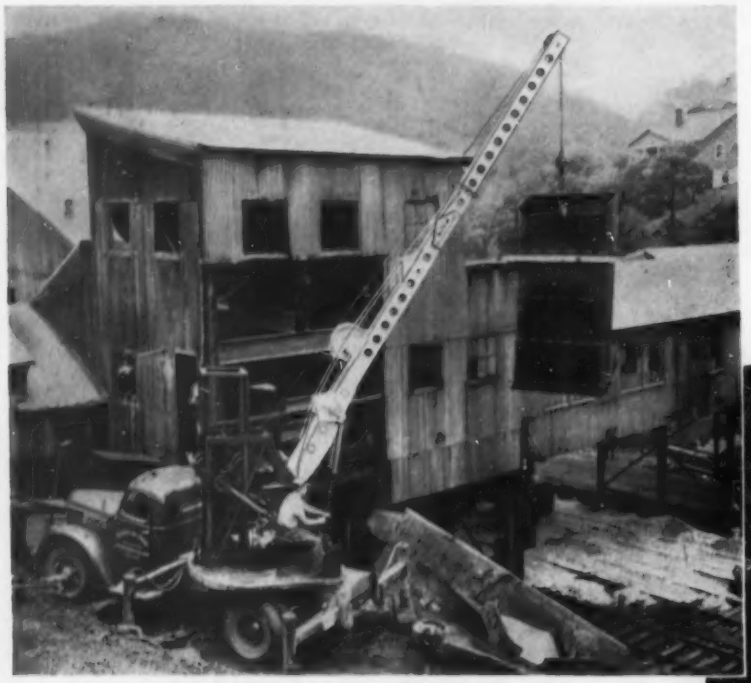


4. While mucking at one heading, with Gismo Transport loading cars one after another with a complete round of rock, drilling Jumbo is busy at another heading.



Extra Reach with Precision Touch

NEW ½-Yd., 9-Ton H-5 HYDROCRANE



Muck comes up, shaft goes down — fast with a Hydromucker. Eliminate tough, expensive hand-mucking with this hydraulic bucket. Controlled from upper shaft, it loads blasted rubble from the shaft floor to skip or other conveyor for removal to the surface. Owners report up to 35 per cent faster mucking, 30 per cent less man power by using the new Hydromucker.

The Bucyrus-Erie H-5 Hydrocrane combines 50 feet of maximum boom reach, plus a 20-ft. jib extension, with all the work advantages of smooth, precise hydraulic power and control, all the travel advantages of a conventional motor truck. In addition, the boom extends and retracts hydraulically within a 12-ft. range — while the crane-excavator is working. With this machine you can handle mine timbers, erect and dismantle conveyor machinery, clean up ore spillage, dig trenches, clean out drainage ditches— maneuver in close quarters with a smoothness and safety never before possible with a crane-excavator in the 50-ft. boom range.

New Flexibility, New Roadability

Patented outriggers permit you to mount the crane on a new or used commercial truck of your choice. You can select a heavy tandem truck for heavy-duty work or a lighter truck for fast between-mine travel, and still meet highway laws for over-all length and axle loads. Both the high-lift 50-ft. boom and the standard 36-ft. boom retract to 25 feet for travel. Maximum over-all length, depending on truck, is under 35 feet.

Get all the facts now on the new H-5 and the improved ⅜-yd. H-3 Hydrocrane from your Bucyrus-Erie distributor. 136H56

BUCYRUS ERIE

South Milwaukee, Wis.

POWER SHIFT
NO CLUTCH
TORQUE CONVERTER

HUBER-WARCO 5D-190 (195 H.P.)

POWER!

Tough grading jobs are handled easily and quickly by this 31,450 pound motor grader, powered by a 195 h.p. General Motors diesel engine.

PERFORMANCE!

An Allison Torque Converter protects the unit from shock loads while a full power-shift transmission — WITHOUT CLUTCH — permits quick shifts under full load without interrupting power flow from engine to load. A tail shaft governor automatically adjusts engine RPM to meet any load condition, at any speed set by the operator. Power sliding moldboard is standard equipment.

PROFIT!

These power and performance features have been combined to increase the working capacity of the 5D-190 and reduce costly down-time. With this motor grader it is possible to move more material, with fewer passes. This increased working capacity will add more profit to every job.

For more information write for Huber-Warco 5D-190 literature — Bulletin HWG-508 and Bulletin HWG-510.

For More Details — See Your Huber-Warco Distributor

SEE YOUR NEAREST HUBER-WARCO DISTRIBUTOR

HUBER W WARCO

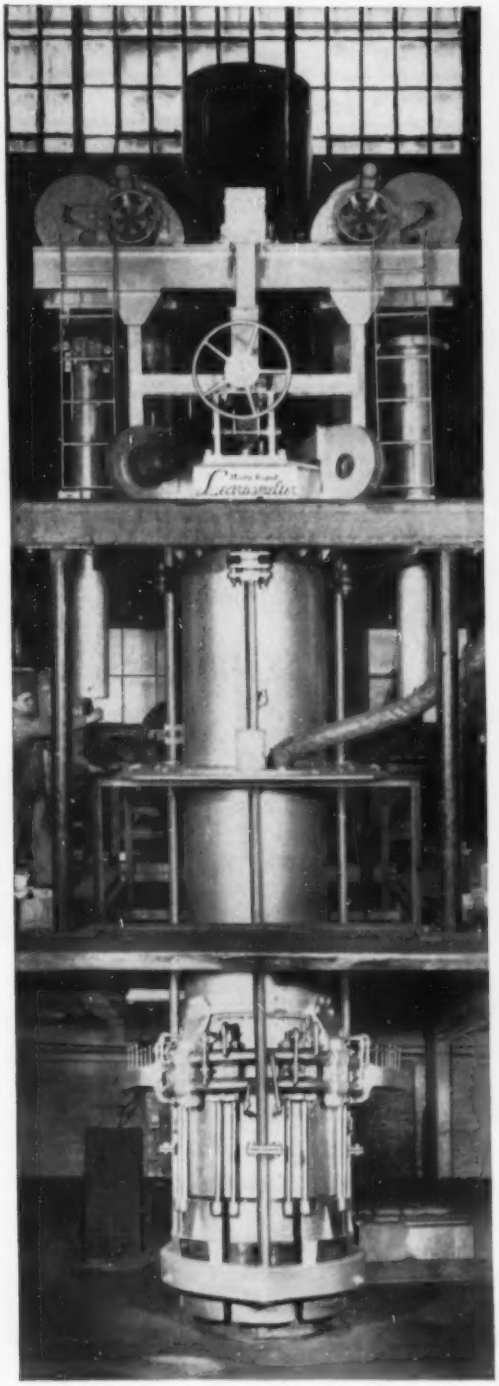
HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

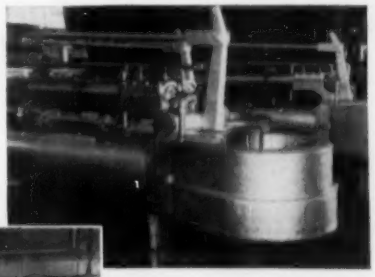
ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

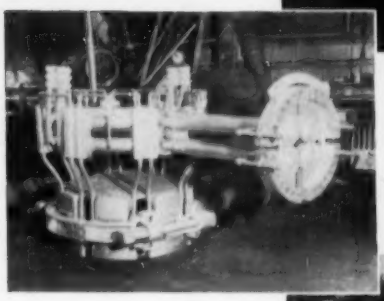


These features help make Lectromelt* Furnace Equipment popular all over the world

LECTROMELT furnace equipment for smelting and refining work is described in Catalog No. 105. For a copy and for help in selecting this equipment, write Lectromelt Furnace Company, 324 32nd Street, Pittsburgh 30, Pennsylvania (a McGraw Electric Company Division).

◀ *Lectromelt builds complete self-baking electrode assemblies. Here you see one of fifteen supplied for a domestic smelting installation, assembled on our erection floor for testing. These assemblies handle 40-inch self-baking electrodes.*





▲ *24-inch power-operated electrode clamps.*

◀ *40-inch Lectromelt electrode clamp, built to our customer's space requirements.*

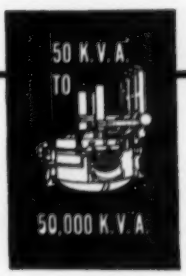
Lectromelt bus bars are assembled in our plant to assure that they fit accurately when erected at your furnace. ▶

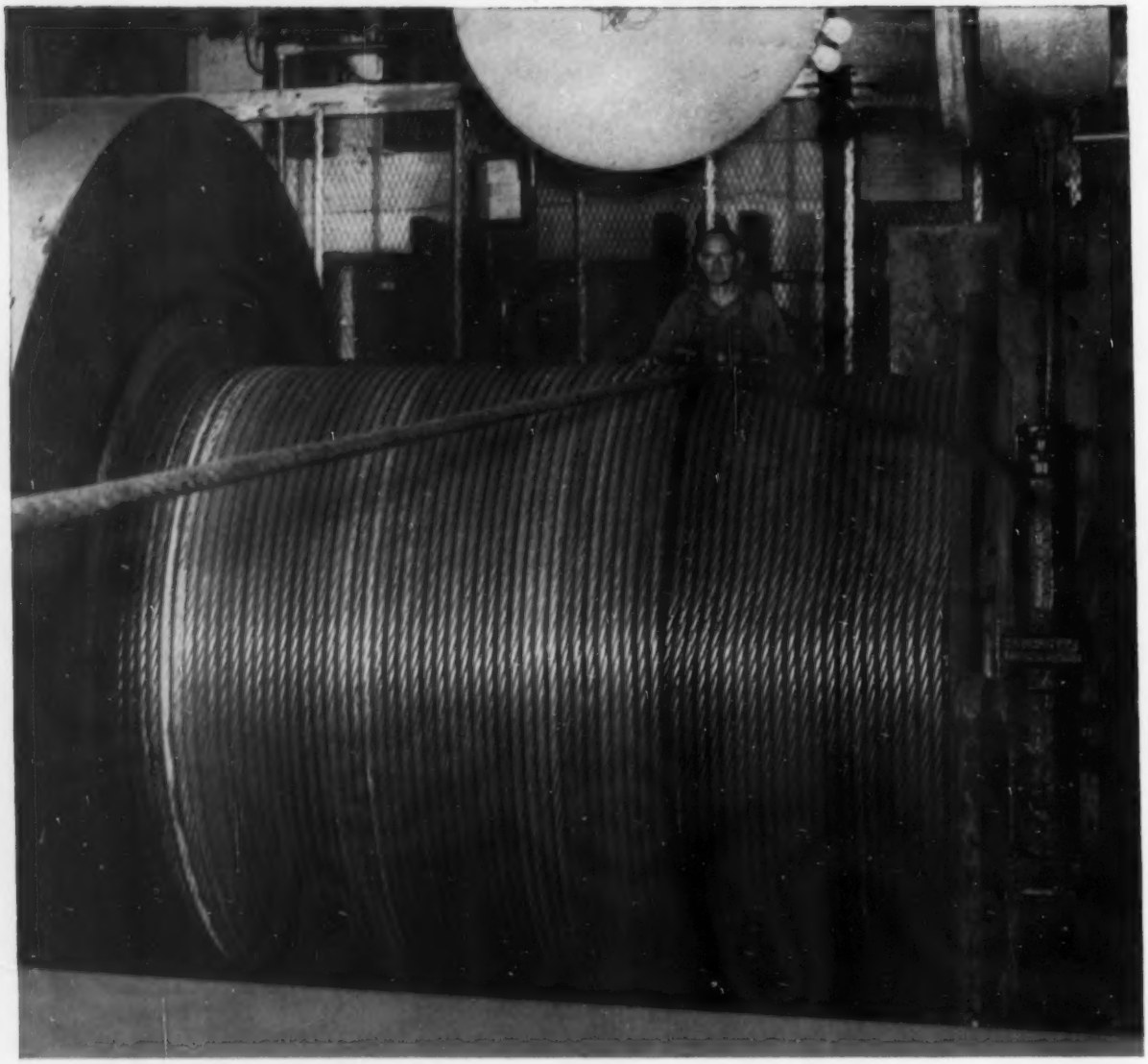
Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... Lectromelt





Wire Rope at Work — You're looking head-on at 8,500 ft of wire rope at the No. 2 Coal Mine, Sunnyside, Utah. One of the longest slope hoist ropes in the West, it's a Bethlehem 1¼-in. flattened strand type of construction. And of course it's Purple Strand, Bethlehem's top grade of rope.

This rope hoists a daily average of 2,400 tons of coal. Formerly operated by the Utah Fuel Company, this mine had been inactive for 18 years when it was reopened in 1942 by Kaiser Steel Corporation. New facilities have been installed and operating practices have been improved, both here and in mines No. 1 and No. 3. Total annual capacity of the Sunnyside operation is about 1,600,000 tons.

In mines and quarries all over the country, Bethlehem wire rope is relied on for the really tough jobs. Your nearest Bethlehem Wire Rope Distributor can give you speedy service when you need wire rope. Or check with one of our sales offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Bethlehem Wire Rope is stocked by leading distributors throughout the West

BETHLEHEM PACIFIC

HOW TO STOCKPILE 25 TONS

A MINUTE

Pittsburgh & Conneaut Dock Co. stockpiles a million tons of iron ore during the summer months, to create a reserve supply when ore boats cannot satisfy extreme demands. Four CAT* DW21s with Scrapers handle 1500 tons per hour for this Conneaut, Ohio, firm. That means a DW21 pulls away from the Stephens-Adamson conveyor every minute with a 25-ton load.

This company works two eight-hour shifts, six days a week during the navigation season. Its equipment must do a lot of work fast, and stay on the job. That's why a company official says: "We've had 12 years of experience with Caterpillar equipment. We considered other makes, but found DW21s did the job best."

Now there is a new and improved DW21 (Series C) with 300 HP (maximum output) Turbocharged engine. It has 10% greater rimpull and new, wide-section 29.5-29 tubeless tires for maximum traction. With the big-target No. 470 LOWBOWL Scraper (25-yd. heaped capacity), here's an ideal team for efficient materials handling and for earthmoving jobs in slack seasons. For jobs that are exclusively stockpiling, many firms find that DW21s with Athey haulers pay off.

If you want fast cycle times and traditional Caterpillar stamina, investigate the DW21 today. Your Caterpillar Dealer has full details and on-the-job proof that these big yellow rigs can do more work in less time at lower cost on *your* operation. And count on him for skilled service and parts you can trust.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Do you have this kind of haul problem?

180° switch-backs; narrow, steep, one-way haul roads; tight quarters

The Standard Slag Company, of Youngstown, Ohio, is handling some difficult hauling problems at their magnesite ore mine, at Gabbs, Nevada. One-mile, one-way haul road is narrow and steep, with sharp 180° switch-backs, loading is on narrow benches. Dumping areas have restricted access. Compact, highly maneuverable machines were needed to handle the job. Standard picked 2 D Tournapull Rear-Dumps for the assignment.

Turns within 12'4" radius

Teamed with a ¾-yard Northwest shovel, the rubber-tired "D's" were opening up a bench for loading when photos were taken. Carrying 11 tons of waste rock, the Rear-Dumps hauled to a narrow 15-ft. wide area where material was dumped over a 100-ft. bank. When full scale mining operations begin, company officials report that the "D's" will haul 500 tons of ore daily to the crushing plant over the winding mile-long road notched into the mountain side.

The two Model D Rear-Dumps have replaced three 8-cu. yd. trucks and are operating at lower hourly cost than the trucks. Records show that, excluding cable, repair parts cost only $257 during 13 machine months use.

Easy to control

"D's" on this job reduce the "hard-work" element by simple fingertip electric controls. Operators have no big steering wheels or manually operated shifts and levers to fight. Fatigue is greatly reduced. Operator C. E. Metcalf reports, "These 'D's' are very easy to control. In fact they are easier to operate than trucks." The Superintendent on the job said, "The D Tournapull Rear-Dumps can't be beat on our narrow bench job."

Safer than trucks

You'll find as did the Standard Slag Co., that D Rear-Dumps are safer than any trucks where loading, hauling and dumping areas are limited. Three important reasons why "D's" offer greater safety are:

1. multi-disc air brakes with 2,822 sq. in. of braking surface, more braking surface on a single wheel than most haulers have on all four;

2. positive power steer through geared king-pin which gives 90° turning, and sure safe control at all times;

3. front-wheel drive which keeps power and traction on solid footing well ahead of rear wheels during dumping. These safety features give operators more confidence on steep grades and narrow roads, as well as when dumping loads over high banks.

¾-yard shovel loads "D" with 11 tons of waste rock. 90° turning ability of unit allows quick spotting on narrow shelf. Wide target permits faster loading.

With front-wheel drive and powerful 4-wheel brakes, unit backs safely to edge of 100-ft. bank, dumps load clean at touch of switch.

Check the advantages of D Rear-Dumps for yourself. See how their maneuverability can speed cycles, cut costs, and increase your profits. Write or call for more information today!

Tournapull—Trademark Reg. U.S. Pat. Off. DR-915-M-bww

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Kenworth 803

TWO AXLE–36 TON CAPACITY

For moving rock and ore, Kenworth's huge new 803 end-dump is the biggest, toughest two-axle, single-engine truck built. Here are all the advantages of two-axle construction—ease of maintenance, short turning radius, economy of operation and less chassis weight—combined with extra ruggedness and big 36-ton capacity . . . 24 cubic yards struck, 28 heaped. With variable section frame, 50,000-pound-capacity front axle and 100,000-pound-capacity drive axle, this spring-mounted hauler is big *all over*. Oversized brakes and power steering provide maximum control. The 803 is available with 300 to 500 h.p. depending on grades of loaded haul. Engine is dustproofed. Twin, straddle-mounted, two-cylinder, fast-acting telescopic hoists, removable for servicing while body is loaded or unloaded, provide fast dumping. All-welded, box-section-ribbed steel dump body is built to last. To move rock and ore, faster . . .

...There's more WORTH in KENWORTH

KENWORTH

TRUCKS ★ BUSES

FACTORY AND HOME OFFICE: SEATTLE, U. S. A., DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

Speed and Mobility

get more work done!

Tournatractor takes the shortest route to job ... via highway or cross country... cuts hours from job-to-job moves.

208 hp Tournatractor with PCU on rear can be hooked up to pull scrapers, rooters, and rollers.

Rubber tires do not damage rails or ties... unit can switch up to 10 fully-loaded railroad cars at once.

Whenever your application involves scattered assignments, Tournatractor's 17 mph forward speed cuts moving costs and reduces the non-pay hours of moving time. Big, low-pressure tires let you drive Tournatractor anywhere. For long moves, you save time, bother and expense of moving in transport equipment and extra men to help load and unload.

Speed on the job

Tournatractor pulls, dozes, pushes at working speeds 2 to 3 times faster than crawler tractors. You have 3.69 mph in second gear, 8.38 mph in third, compared to crawler speeds of around 2 mph in second, and 3 mph in third. Tournatractor travel speed of 17.39 mph compares to the crawlers' top ranges of 4 to 6 mph.

8 mph reverse speed

High reverse speeds give a very important time-saving advantage to Tournatractor. Nearly 50% of your working cycle on dozing or pushing is spent backing up. Crawler highs in reverse range from 3.1 to 6.2 mph. Tournatractor high in reverse, 8 mph.

Instant shifting

Constant-mesh transmission aids high-speed performance by eliminating delays in changing gears, saves vital momentum, gives you any gear ratio instantly. Torque converter increases this advantage by giving wide automatic over-lapping of gear ratios, without depending on operator to adjust levers for the most effective ratio of power and speed to load.

Ample flotation and traction

Big tires, 2 feet wide, stay on top of soft ground instead of digging in. Lugs bite into underfooting to give traction. Tire pressures as low as 20 lbs. absorb shock. Rolling action compacts loose materials far more effectively than crawlers.

Lower maintenance

There are 4 wheel assemblies compared to more than 500 wearing parts in standard track-assemblies. This means much less maintenance.

Easier to operate

Steering, raising and lowering the blade, and operating the power-control-unit, are all handled by simple electric buttons on the dashboard. There are no levers, wheels, or other manual controls to handle.

Interchangeable equipment

Adding to Tournatractor's versatility are a number of interchangeable attachments . . . Bulldozer, Angledozer, Root Rake, Snow Plow. This versatile tractor can also be equipped with a Push-Block, Logging-Winch, or Tree-Pusher for additional applications. Drawbar and PCU are available for hauled equipment.

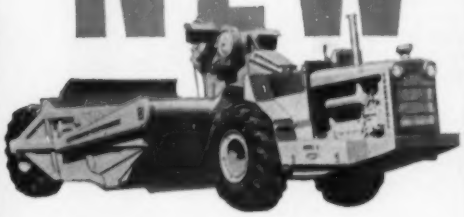
Find out for yourself how Tournatractor's mobility and 17 mph speeds can help you get more work done. Write for complete information.

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

NEW



"C" Fullpak Scraper

10 ways better

Improved design gives faster loading, with 18-yd. heaped capacity

1. ***Lower, wider bowl*** — New C Tournapull "Fullpak" bowl packs load fast, rolls dirt high to fill corners, heaps a profitable pay-load.

2. ***Good visibility*** — Low yoke lets operator clearly see cutting edge, load and pusher. Gives better control of power in loading, permits more accurate spread.

3. ***High apron lift*** — 6'1" lift allows fast, easy loading and unloading of rock and chunky materials.

4. ***Bowl wipes clean*** — Smooth wiping, positive-ejection tailgate, with curved deflector plate, cleans stickiest materials from bowl. No wasteful haul back.

5. ***Direct push-block*** — Low push-block matches tractor push plates, carries thrust direct to blade for maximum cutting power.

6. ***Easy bowl pumping*** — Quick-release clutch, plus fast electric hoist, gives operator instant action controls, permits fast "pumping" of bowl for quick-loading in loose materials.

7. ***Plenty of power and speed*** — Rugged 208 hp prime-mover provides ample lugging power for fast loading, and haul speed to 30 mph, offers choice of constant-mesh or sliding-gear transmission.

8. ***Power matched to load*** — Exclusive power-equalizing differential automatically gears pull to traction, takes slippery materials in stride.

9. ***Independent power-steer*** — Easy power-steer through geared kingpin permits "walking" prime-mover to firm footing under any loading drag.

10. ***Effortless control*** — Electric motors at point of action give instant, effortless push-button control of steer and bowl operations.

Get the complete story on this lower, wider, faster-loading new Fullpak C Tournapull. Ask your LeTourneau-Westinghouse Distributor (or write the factory) for complete details and specifications.

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

IN LATTER-DAY GOLD RUSH, THIS **D8** WORKS **FAST**

When each yard of dirt contains only a few cents' worth of gold, and when you have to pack a full year's mining into three summer months—you need dependable equipment that works *fast!*

That's why B. Bratsberg has a Caterpillar D8 Tractor. He owns and operates Gold Bottom Placers near Dawson, Yukon Territory. His mine is two miles from "Henderson's Discovery," which started the gold rush in 1896. But his mining method is vastly different from 60 years ago: Mr. Bratsberg's D8 strips and 'dozes into the sluice box and stacks tailings. With its No. 8A Bulldozer it moves 4½ cu. yd. each load and averages a load a minute while sluicing.

"Our short season means we've got to keep going," Mr. Bratsberg says. "I wanted a tractor that was dependable and able to do a lot of hard work. My D8 moves a lot of yardage economically." During the three-month summer season this CAT* D8 Tractor works nine hours a day, seven days a week. It went seven years (4800 hours) before overhaul.

And now there is a new D8 that will perform even better. The Caterpillar D8 Tractor, with torque converter or with exclusive oil clutch, has a completely new, 191 HP diesel engine. Controls are hydraulically boosted and easy on the operator. "Live-shaft" drive lets you operate rear-mounted equipment independent of the flywheel clutch.

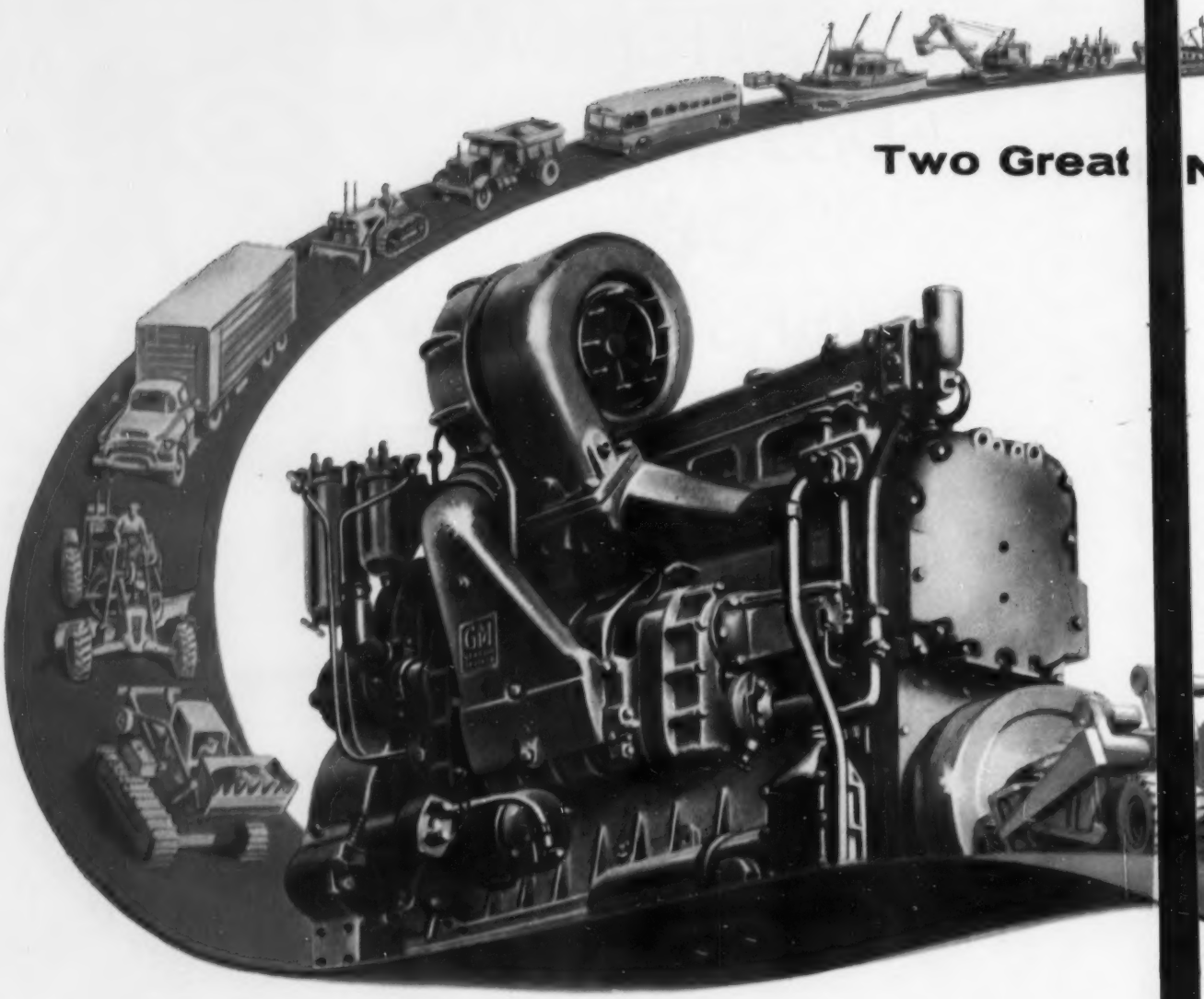
The new D8 is available with a choice of bulldozer blades and controls to suit your operation. Your Caterpillar Dealer will be glad to demonstrate the D8 or other Cat Diesel Tractor on *your* job. Call him today and find out about the tractor that will produce the most at the lowest cost.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE



Increased Power—Decreased Fuel

Here's exciting news for power users—great new 4- and 6-cylinder GM Detroit Diesel engines that represent another long forward step by the leader in the Diesel engine field. With this new, more efficient Detroit Diesel Turbopower you can have up to 17% more power with no increase in fuel consumption—or the same power output with fuel saving up to 15%.

Detroit Diesel engineers have Turbocharged 2-cycle Diesels by combining an exhaust-driven turbine with the engine blower to deliver a larger supply of fresh air to the cylinders. Result: improved combustion, freer engine breathing, quieter and more efficient performance in the higher speed ranges.

Turbopower Diesels are additions to Detroit Diesel's time-proved Series 71 line, world's most widely used Diesel engines. The four-cylinder Turbopower Diesel delivers 171 H.P. at 2300 R.P.M.; the six-cylinder engine produces 280 H.P. at 2300 R.P.M.

To truckers Turbopower means speedier, more economical movement of big payloads.

To boatmen it means faster speed or longer cruising range—more room for cargo.

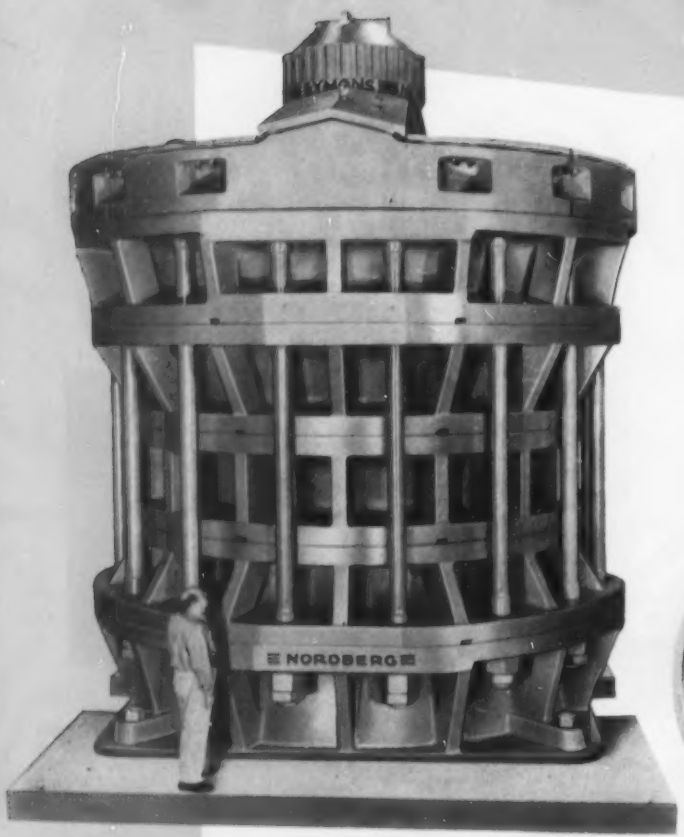
To contractors and other industrial users it means greater work output from higher-powered engines or improved economy.

For the full story of 2-cycle Turbopower, write us or call your nearest GM Detroit Diesel Distributor or Dealer.

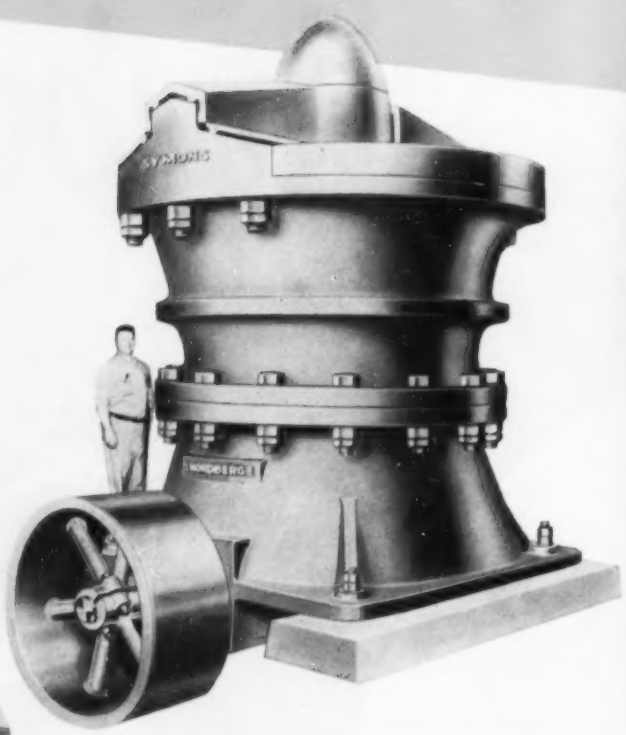
AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

SYMONS®

GYRATORY AND
FOR PRIMARY AND



SYMONS 60" GYRATORY CRUSHER



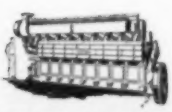
SYMONS 30" GYRATORY CRUSHER

SYMONS
VIBRATING SCREENS

NORDBERG BALL,
TUBE AND ROD MILLS

SYMONS
VIBRATING GRIZZLIES

NORDBERG
MINE HOISTS

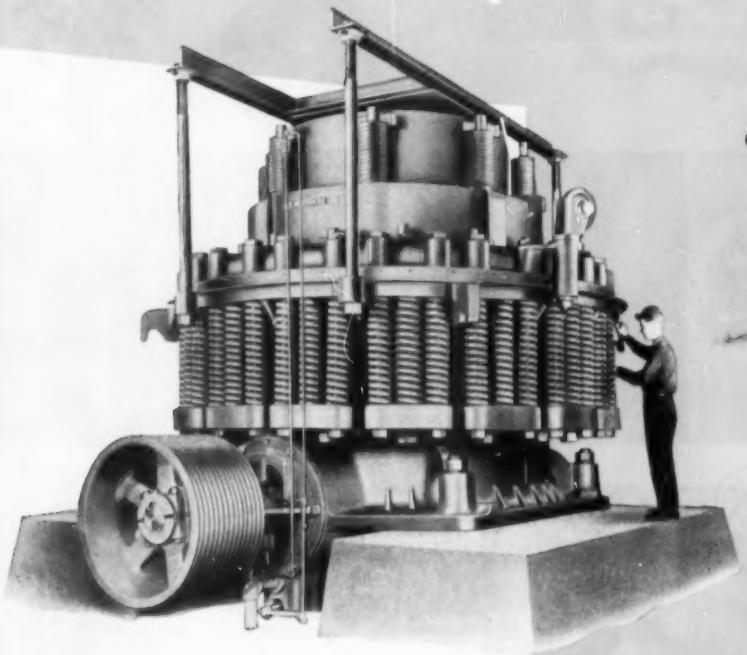


NORDBERG DIESEL—DUAFUEL® and
SPARK-IGNITION GAS ENGINES

CONE CRUSHERS FINE REDUCTION

. . . greater productivity through more efficient crushing

Complete range of sizes from 6 to over 3500 tons per hour



All over the world, for big tonnage requirements and heavy duty crushing operations, Symons Gyratory and Cone Crushers are the outstanding choice of the mining and quarrying industries . . . because they *assure maximum and continuous production at low operating and maintenance costs.* For heavy duty primary breaking, Symons Gyratory Crushers are available in 30″, 42″, 54″, 60″ and 72″ sizes, for capacities up to 3500 and more tons per hour. For secondary and finer reductions, Symons Cone Crushers, in both Standard and Short Head types, are available in sizes ranging from 22″ to 7′—in capacities from 6 to 900 or more tons per hour.

Write for further information—Nordberg stands ready to serve you.

NORDBERG MFG. CO., Milwaukee, Wisconsin

SYMONS 7′ EXTRA HEAVY DUTY CONE CRUSHER

C256

SYMONS . . .

A REGISTERED NORDBERG TRADEMARK

KNOWN THROUGHOUT THE WORLD

NORDBERG

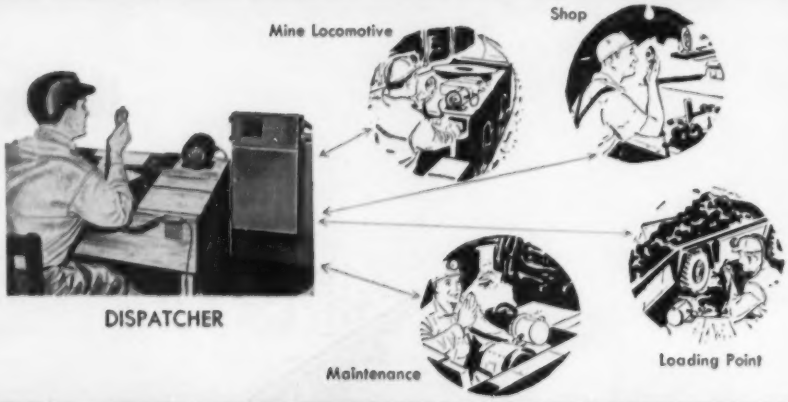
MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

Increase Your Production and Mine Safety with these M·S·A Communication Systems

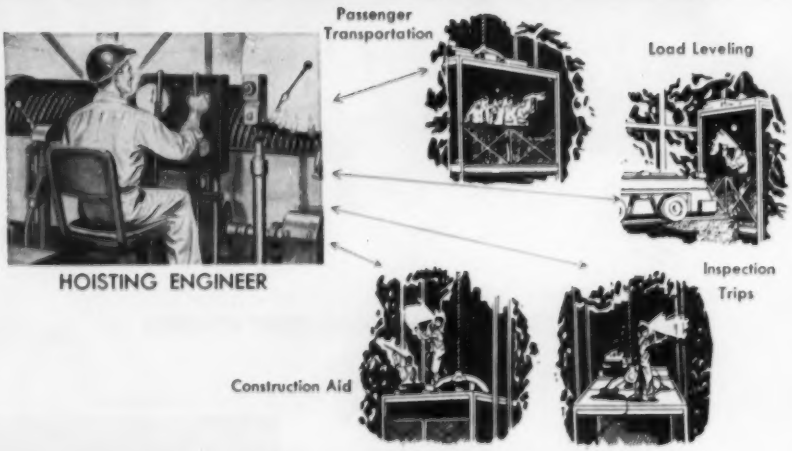
MinePhone

The M.S.A. MinePhone is eliminating communication delays in many modern mines everywhere. This clear, instant two-way voice communication system coordinates the wide variety of operations vital to peak production. Haulage moves faster because dispatcher and motormen are constantly in touch, even while trips are in motion. Shop and maintenance personnel are always "on call" to keep mining equipment in operation. Because messages are relayed instantly, on an open-line hook up, the MinePhone brings an added measure of safety to all operations. Write for details.



HoistPhone

The M.S.A. HoistPhone provides continuous, dependable and efficient voice communication between hoisting engineer and cage, at any level, and when in motion. The system is invaluable in emergencies, yet designed for day-in-day-out service. Ideal for passenger travel, load leveling, inspection trips, and construction work, the HoistPhone requires no special training; utilizes existing wiring. Write for complete details.



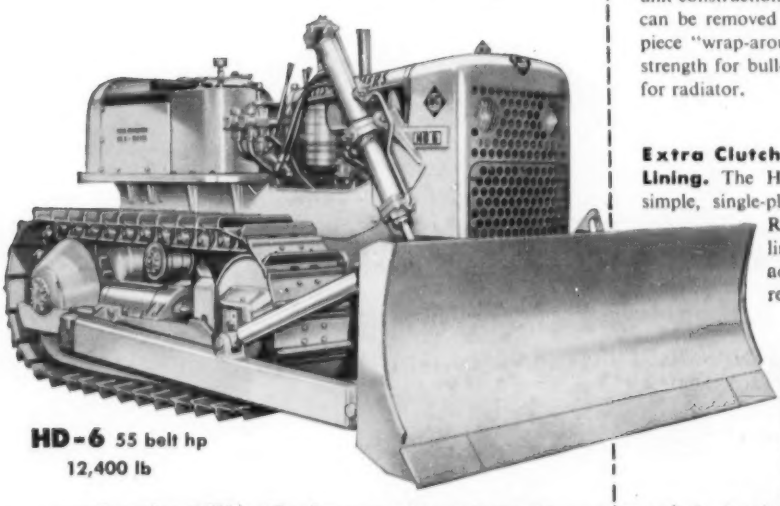
MSA
SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M.S.A. is at your service. Our job is to help you.

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At your service: 77 branch offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

This kind of Crawler Tractor Design gives you extra output



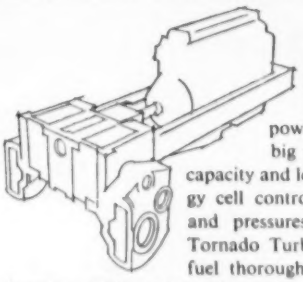
HD-6 55 belt hp
12,400 lb

. . . and only Allis-Chalmers HD-6 has it—
advanced design features that combine big performance, versatility, dependability and simplified servicing!

Look at the Allis-Chalmers HD-6—you can see its functional design . . . how it's built to give sure-footed traction, better working balance. But there's more to this crawler tractor than meets the eye—the performance advantages of Allis-Chalmers advanced basic design. It provides more working power, more strength in all components, more working weight where it's needed . . . makes the HD-6 an outstanding performer with drawn or mounted equipment . . . easier to operate and maintain.

Let your Allis-Chalmers dealer show you how the HD-6 can give you that *extra* output on your jobs.

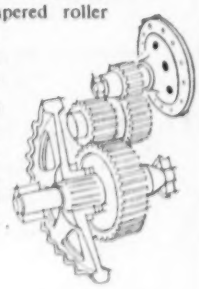
ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN



Allis-Chalmers Heavy-Duty Diesel Engine. The HD-6 power plant is designed for big output, ample reserve capacity and low maintenance. Energy cell controls combustion timing and pressures for high efficiency. Tornado Turbulence mixes air and fuel thoroughly for more complete burning. Follow-Through combustion sustains effective working pressures to take advantage of better crankshaft leverage.

Special Strength and Protection. Exclusive all-steel box-A main frame makes possible superior over-all balance, better equipment mounting . . . plus service simplicity of unit construction. Major assemblies like engine and clutch can be removed without disturbing adjacent parts. One-piece "wrap-around" radiator guard provides maximum strength for bulldozer mounting . . . complete protection for radiator.

Extra Clutch Life—with Ceramic Lining. The HD-6 master clutch offers simple, single-plate, over-center design. Revolutionary new ceramic button clutch lining keeps clutch operating longer between adjustments . . . lengthens clutch life . . . reduces lever pull for easier operation.



Straddle-Mounted Final Drive Gears. Tapered roller bearings support both ends of the final drive gear shafts. Smaller gears and shorter shafts (plus line-bored, one-piece case), provide better bearing and gear alignment, more strength, longer life. Double-reduction final drives provide greater ground clearance.

New-Design, Heavy-Duty Track. HD-6 track provides long life under the toughest conditions. HD-6 sidebars have more steel where it's needed . . . benefit from new heat-treating methods which make possible new standards of strength and hardness throughout for extra wearability.

Other Outstanding HD-6 Features

. . . no other tractor in this size class has them—at no extra cost you get roller bearing truck wheels, idlers and support rollers; 1,000-hour lubrication intervals for truck wheels, idlers and support rollers; 24-volt direct electric starting; crankcase guard; bumper; and lights.

ALLIS-CHALMERS

Right down the steel production line . . .

Macks HANDLE THE IMPORTANT JOBS

Despite the punishing service, these husky, dependable Macks help keep steel production booming, right down the line. Like all Macks, they're engineered to the job, with extra stamina and staying power built in to meet the most extreme requirements.

If you haul important loads . . . Mack-sized loads . . . on fast long-distance highway runs, on start-and-stop delivery service through heavy city traffic, or operate over terrain where roads are unknown, it will pay you to standardize on Macks. Take advantage of Mack's unmatched experience, production skills and uncompromising standards of workmanship to get your cargoes moved on schedule, at the lowest cost per mile.

See your Mack factory branch or distributor.

FACTS ON MACKS

FIRST—FOR THE FIFTH YEAR! *Again in 1955, Mack was the unchallenged favorite among all diesel trucks—with 42.06% of total sales! The exceptional fuel economy of the Mack Thermodyne® Diesel engine, low maintenance costs, and amazing long life account for Mack's overwhelming preference among truck operators of every size in every field.*

Mack

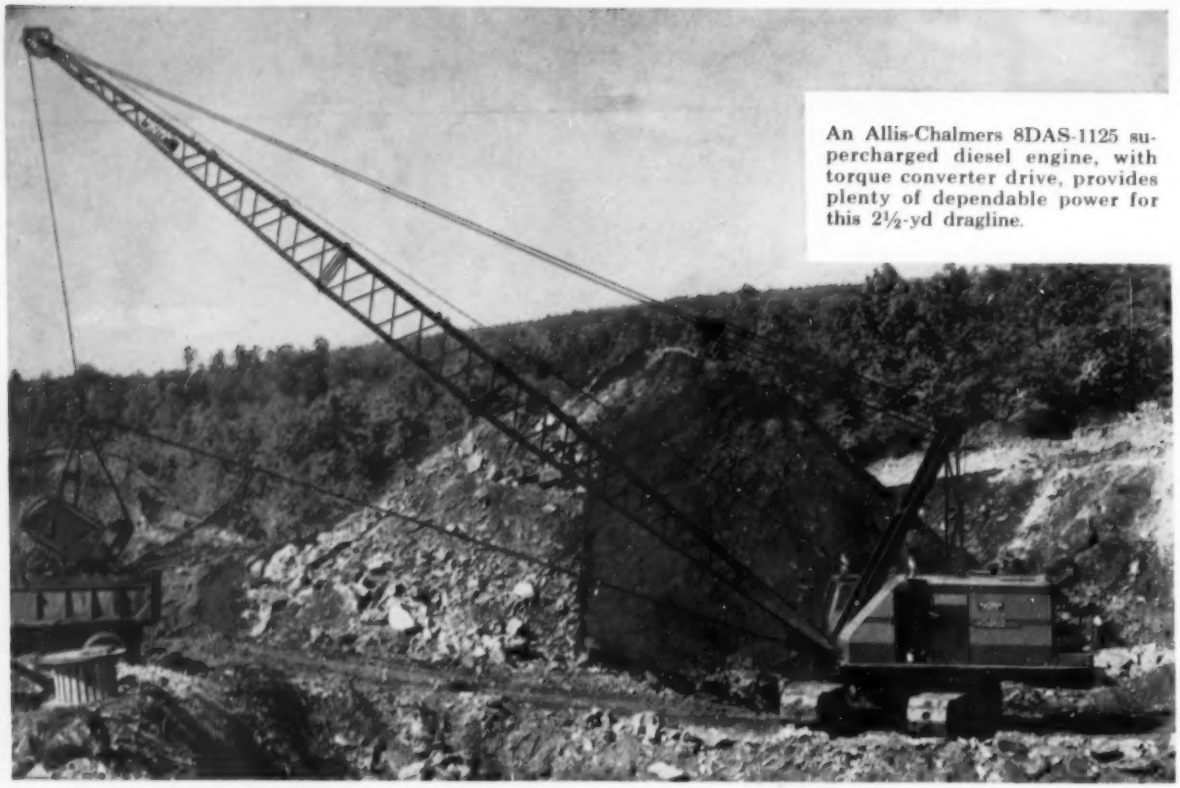
FIRST NAME FOR TRUCKS

Empire State Building, New York 1, N. Y.
In Canada: Mack Trucks of Canada, Ltd.

At iron and steel mills, Mack dump trucks haul slag from the enormous furnaces. Other Mack trucks shuttle semi-finished materials from one operation to the other on precisely-timed schedules, and deliver finished mill forms to warehouses.

Millions of pounds of steel—girders, window frames, beams, pipe and fastenings—for America's new schools, industrial plants and office buildings are delivered exactly when needed by Macks like the husky lightweight tractor shown on the job here.

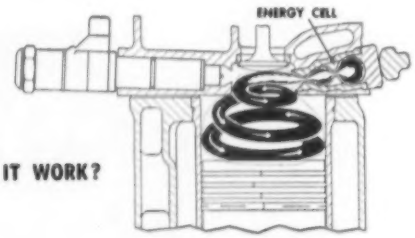
Huge Mack dumpers carry tremendous loads of ore from the crater-like open-pit iron mines, climbing steeply spiralling hauling roads, keeping tight schedules 24 hours a day, seven days a week.



An Allis-Chalmers 8DAS-1125 supercharged diesel engine, with torque converter drive, provides plenty of dependable power for this 2½-yd dragline.

WHAT "*Follow-Through*" COMBUSTION IN ALLIS-CHALMERS DIESELS DOES FOR YOU

"Follow-Through" combustion describes the way fuel burns in an Allis-Chalmers diesel engine. Because of it, more energy is released by combustion into productive power . . . engines last longer.

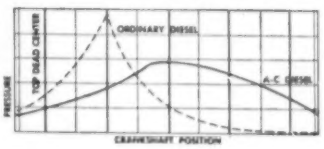


HOW DOES IT WORK?

Fuel is injected into the combustion chamber and into a special *energy cell*. Combustion starts in the chamber and spreads into the energy cell, where it ignites under tremendous pressure and heat. After a split-second delay, pressure from the energy cell creates a cyclone turbulence in the combustion chamber. This atomizes the fuel and provides a thorough fuel-air mixture. This action produces highly efficient burning, builds up combustion pressure slowly and evenly and retains it longer.

BC-3B

ADVANTAGES OF "*FOLLOW-THROUGH*" PRESSURE



This chart compares combustion pressures at different crankshaft positions in Allis-Chalmers and ordinary diesel engines. In ordinary diesels (dotted line), pressure builds up fast, producing a hammer blow shock load while crankshaft is near dead center.

In the Allis-Chalmers engine, effective pressures are sustained over a longer period when leverage on the crankshaft is more favorable. There is more turning force available for work and it is applied against the crankshaft smoothly.

Result: More sustained power, smoother operation, longer engine life.

"Follow-Through" combustion is just one of many things that are "so good" about Allis-Chalmers diesel engines. You can get the full story from your Allis-Chalmers Buda Division engine dealer.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

COUNT ON YOUR WICKWIRE ROPE DISTRIBUTOR FOR ENGINEERING ASSISTANCE

When it's a question of wire rope, the place to go is to your Wickwire Rope distributor. He knows your requirements. He knows wire rope and how it can be used to best advantage. In addition, he can provide you with this important extra—the technical assistance of Wickwire Sales Engineers. With the additional help of these capable specialists, he can give you expert, practical advice on even the toughest wire rope problems.

Your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and wire rope slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3150

a **JEFFREY** fan gives the most ventilation for your money

Lowest first cost, economy of operation and dependable service

Jeffrey makes fans for every mining condition. Midget blowers are supplied as auxiliaries, Junior models for low pressure work, and mammoth multi-stage units for high-pressure, high-volume ventilating service.

For 49 years, Jeffrey engineers have been helping mine operators solve ventilation problems. The experience and scientific knowledge they have gained is available to you to help assure proper application and selection of Jeffrey equipment.

Catalog 901, just published, gives valuable mine ventilation data and shows typical arrangements and drives to suit various conditions. It also tells you how to select Jeffrey equipment and includes dimensions to assist your layout men.

For a copy, or for other information, write The Jeffrey Manufacturing Co., Columbus 16, Ohio.

JEFFREY

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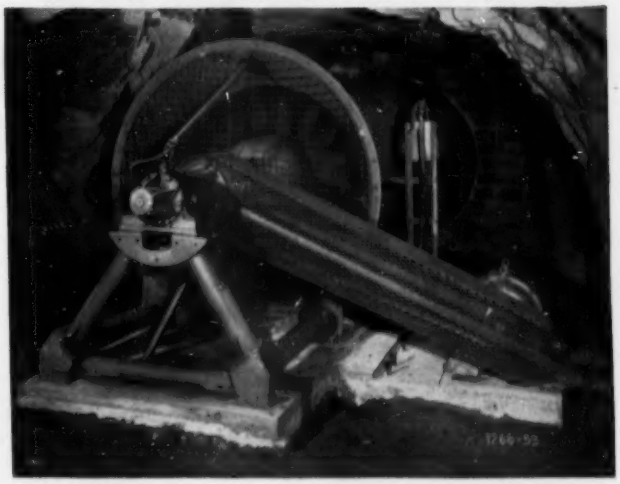
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

AERODYNE® Fan ventilating a South Dakota gold mine.



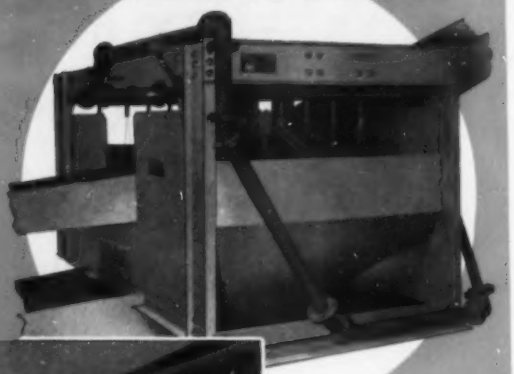
AERODYNE® Fan installed underground in an iron mine.

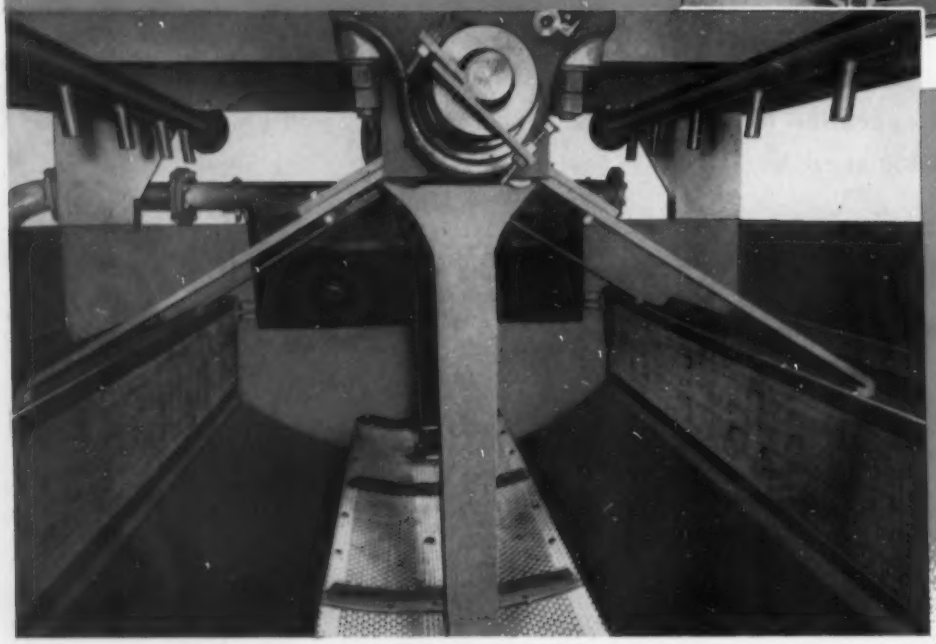
AERODYNE® Midget Blower serving a potash mine in the West.

Now...BETTER HM SEPARATION

with OCC Vessel

because of its large productive pool area





Left, view of the interior of the OCC Heavy Media Vessel, illustrating its large pool area; view is from discharge end of vessel. Above, exterior view: float and sink discharges on left and feed chute on right.

U. S. and Foreign Patents Pending

Simplicity of OCC Vessel Introduces Broad Operating Economies

Since the introduction of the Heavy Media process, the development of a separator whose simplicity would match that of the process has been an aim. This has been achieved through the design of the OCC Vessel illustrated above. The rake suspended in the center oscillates the width of the vessel. In so doing, it maintains in productive use practically the entire volume of the vessel, in contrast to other separators employing only a fraction of same. The result is improved metallurgy and increased economy.

The remarkable simplicity of the vessel is pointed up by the fact that the rake, the only moving part in the vessel, performs not only the function of removing the sink but also that of keeping the medium in suspension. Let us send you details of how the OCC vessel can increase your operating profits, and reduce maintenance costs in an HMS plant.

Send for information on pilot plant demonstration & testing services.

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Division: Mining & Milling Machinery • 80 BROAD ST., NEW YORK 4, N. Y.

Capitol Concentrates

Senators Present Mining Industry's Views at White House Conference

A large group of Republican Senators conferred with the White House on May 1 in an effort to clarify the Administration's attitude toward the many mining bills now under consideration by the Senate. These bills relate to extensions of buying programs for strategic and critical minerals, bonuses, and other matters vital to the domestic mining industry.

The unofficial reports coming from that conference indicate that very definite progress is being made toward radical changes in the Administration's attitude. It was brought out that extension of the stockpile purchasing would be nothing more or less than "a shot-in-the-arm" solution since it offered no permanency and could only be of relatively short duration. A bonus plan was not approved as the real answer by either the Senators or the Administration and it was side-tracked as something which neither the industry nor the Administration wanted or believed desirable from the point of view of the mining industry or the country as a whole.

The reports from the conference indicated that there is a trend of thinking toward tariffs as being an answer to the domestic mining industry's problems. This is a very definite change, and concession, in the Administration attitude as it has been expressed for some time in the past.

It was recognized, however, that the situation in the domestic mining of many of the minerals and metals requires that something be done and done quickly by both the Congress and the Administration. The conference was an effort to steer the direction of activities in a manner that would be acceptable to those with opposing ideas.

This conference, it is felt, will result in definite moves in the near future toward some limited extension of stockpiling programs, possibly only in tungsten and asbestos, and that some proposals will be made shortly by Administration sources for tariff programs which will give a long-range answer to the domestic mining industry's problems. It is possible that these proposals will follow somewhat along the line of the protection now provided copper where tariffs are imposed only after a floor price is reached and which is believed by the mining industry to be the most satisfactory solution of the difficulties.

There has been no official report concerning the findings of this conference or what, if anything, had actually been agreed upon, but the unofficial reports "leaking" from some of those who attended the conference indicate that the Administration feels something must be done, and done promptly, and that cooperation can be expected from the Administration in finding answers which will be agreeable to domestic mining and yet not be contrary to Administration policies.

It was felt that the results of the conference will prove to be a real victory for domestic mining.

• Senate Subcommittee Mineral Hearings

Witnesses from all parts of the country appeared before the Minerals, Materials and Fuels Subcommittee of the Senate Interior and Insular Affairs Committee to testify regarding the need to extend the life of the various domestic strategic mineral purchase programs. Numberwise, the manganese, tungsten and mica producers predominated, but all branches of the strategic minerals industry were represented.

Under consideration were a total of 11 bills. They call for the continuation or initiation of mineral purchase programs for tungsten, manganese, chromite, mica, asbestos, beryl, columbium-tantalum, mercury, and antimony. In addition, there is the omnibus bill, S. 3453, by Chairman Murray and 10 other Democratic Senators, and 12 Republican Senators to provide assistance to the above-named mining industries.

At the hearings on April 19, 20, 21 and 25, only industry witnesses were heard, except for testimony by the Barter and Stockpiling Division of the Department of Agriculture, and the Office of Industrial Resources of the International Cooperation Administration. These were asked to explain United States activities in foreign minerals. The hearing scheduled for April 26 was postponed until May 2 and 3 because of the unavailability of ODM Director Flemming and Interior Department's request for more time to study the bills. The death of Senator Albin Barkley caused a further postponement, subject to the call of the chair.

In contrast to testimony at other hearings, witnesses this time laid more stress on the economic aspects of mining—the benefits to the local, state, and federal government from resulting taxes and employment. Possibly the veto message on H. R. 6373 last summer discouraged emphasis on the national defense angle. Another point emphasized was the fact that in spite of many promises the Administration has not come forward with a satisfactory domestic mineral policy, and there also was great dissatisfaction expressed over foreign procurement programs.

It seems to be conceded that government witnesses will oppose initiation or extension of any purchase program (except possibly for a modified extension of the tungsten and asbestos programs). In fact, ODM already has stated that it sees no need for continuation of purchase programs for mercury, beryl, columbium-tantalum, and asbestos; that stockpile goals for these minerals had largely been met; and that sufficient authority exists under the Defense Production Act to obtain any needed supplies without further specific legislation.

• House Awaits Senate Decision

No hearing dates have been set as yet by the House Interior Committee for the various mineral bills now before that committee. It is believed that no House hearings will be held until the outcome of the Senate hearings is known.

• Malone Plans For Tariff Bill

It is understood that Senator George Malone of Nevada has stated that the Administration will look favorably on a bill to protect with high tariffs the seven minerals now under the Office of Defense Mobilization–General Services Administration purchase programs rather than extend the present programs or go to subsidies. He is said to have such a bill in preparation. If true, this is the biggest about-face on mineral policy we yet have seen in the White House.

• Fluorspar Producers Seek Subsidy Program

As is well known, the fluorspar industry is in great distress due to low-priced foreign competition. The fluorspar producers are asking for a subsidy program of a similar type to that which would be set up under S. 3453, the strategic mineral bonus bill.

• Unexpected Comment Made by Wormser

The domestic miners working under the various expiring strategic metal purchase programs noted with interest a speech delivered by Assistant Secretary of the Interior Felix Wormser at St. Louis in April. Wormser said, in part, "I do not believe we shall have to worry much longer about tariffs, quotas, stockpiling, barter, or subsidies to assist domestic mining industries. My own concern is that inadequate supplies of some of our metals and other minerals may actually retard our progress and that of the free World."

COMING CONVENTIONS

June 7 to 9, 1956. THIRD INTERNATIONAL LIGHT METALS CONVENTION, Montanistische Hochschule, Leoben, Austria.

June 25 through 29. Annual Meeting AMERICAN SOCIETY FOR ENGINEERING EDUCATION, Iowa State College, Ames, Iowa.

June 25 through 28. National conference and uranium and atomic industry. Sponsored by ATOMIC INDUSTRIAL FORUM and DENVER UNIVERSITY. Meetings in Denver and field trips to Grand Junction, Colorado and Moab, Utah.

June 28, 29, 30, and July 1. NATIONAL OIL AND URANIUM EXHIBITS featuring machinery exhibits and mechanical devices. The 48th District Agricultural Association Building, Santa Ana Freeway and Eastern Avenue, Los Angeles, California.

September 4 through 11. INTERNATIONAL GEOLOGIC CONFERENCE, Mexico D. F., Mexico.

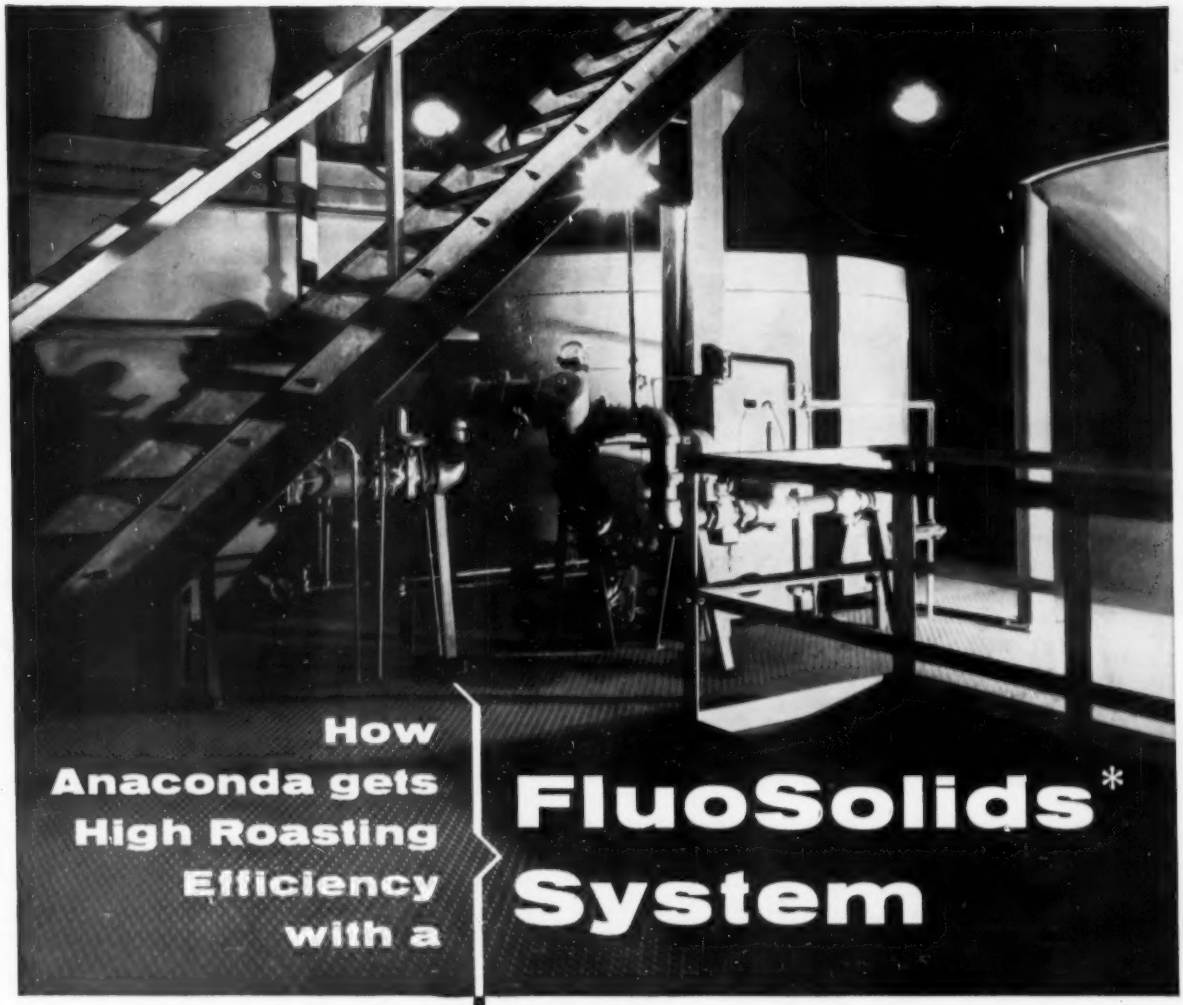
September 18 through 21, 1957. INTERNATIONAL MINERAL DRESSING CONFERENCE, Royal Institute of Technology, Stockholm, Sweden.

September 24 through 28. Annual conference and machinery exhibit of the ATOMIC INDUSTRIAL FORUM, Navy Pier, Chicago, Illinois.

September 26, 27, 28. Annual ROCKY MOUNTAIN MINERALS CONFERENCE, AIME, Salt Lake City, Utah.

October 1 through 4. Mining show and exposition of the AMERICAN MINING CONGRESS, Shrine Hall, Los Angeles, California.

November 1, 2, 3. Annual convention of the NEW MEXICO MINING ASSOCIATION, Carlsbad, New Mexico.



How Anaconda gets High Roasting Efficiency with a FluoSolids* System

For sponge iron production at Anaconda, Montana, Anaconda Company needed a calcine containing less than 1% sulfur. Their conventional fixed bed pyrite roasters, producing gas for an acid plant, delivered a calcine averaging 2 to 6% sulfur. The problem was solved by installing a Dorrco FluoSolids System for an additional roasting stage.

Unique in this installation is the fact that roasting is carried out autogenously on pyrite containing as little as 2% sulfur. Only outside fuel required is for starting up the System. What's more, with sulfur in the feed all the way from 1 to 9%, calcine from the FluoSolids System consistently contains 0.8 to 0.9% S. The FluoSolids Reactor has an inside diameter of 10′ and handles 200 TPD at 1200°F.

High roasting efficiency is just one of the many advantages of fluidization. If you'd like more information on the Dorrco FluoSolids System, the most significant advance in roasting techniques in the last 30 years, just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

*Trade-Mark Reg. U. S. Pat. Off.

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INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
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AERO® Brand Cyanide Available *from Basic Integrated Production*

Cyanamid customers are assured of an unfailing supply of AERO Brand Cyanide to cover their complete needs. Basic, integrated cyanide production in both hemispheres doubly assures continuance of our performance record: "Through two World Wars no Cyanamid customer has ever had to curtail or shut down mill operations for lack of AERO® Brand Cyanide".

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On the basis of contained NaCN equivalent, the metallurgical efficiency of AERO Brand Cyanide equals that of any other grade.

AERO Brand Cyanide has an inherent protective alkali content which usually reduces lime requirements.

AERO Brand Cyanide is clean, easy to handle and has been used for years with perfect satisfaction by small and large mills alike.

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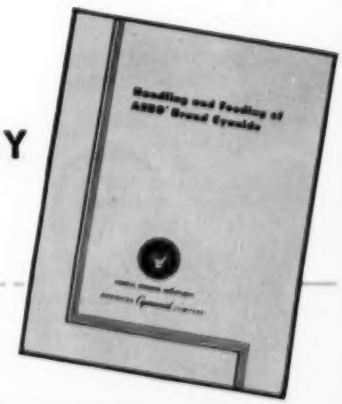
Our Field Engineers are always available to assist on metallurgical problems. They bring you the combined experience of a mature world-wide technical staff and the research resources of Cyanamid's Mineral Dressing Laboratory.

To further assist AERO Brand Cyanide users we have recently issued

Mineral Dressing Notes No. 22

HANDLING AND FEEDING OF AERO® BRAND CYANIDE

This 16-page manual contains a wealth of practical suggestions and diagrams of feeder arrangements for both small and large mills. A copy will be sent with our compliments.



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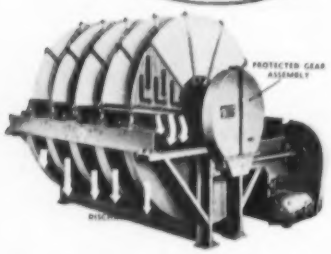
DENVER CAN SUPPLY COMPLETE EQUIPMENT FOR YOUR MILL

One Responsibility

Crushers, Screens, Feeders, Ball-Rod Mills, Classifiers, Jigs, Pumps, Samplers, Agitators, Conditioners, Flotation, Thickeners, Filters, Dryers, Ore Testing and Mill Design Services.



DENVER DISC FILTERS
Give You These Advantages—

- DRIER FILTER CAKE, with positive gravity drainage of filtrate before blow-off.
- LOWER MAINTENANCE COST—all wearing parts are designed for long life.
- LARGER FILTER AREA per unit of floor space.
- WIDE OPERATING FLEXIBILITY—Two or more products can be filtered at the same time.
- Available in sizes from 2′ - 1 disc to 9′ - 12 disc.
- Drum Filters also available.

WRITE FOR BULLETIN NO. FG-B1.

DENVER High Capacity THICKENER is Completely *AUTOMATIC*

PROBLEM

Today's *new thickening techniques* require a new, high capacity thickener.

New flocculating agents that increase settling rates from 200% to 1000% mean *thickeners must move high tonnage* of fast settling solids and *handle overloads that build up fast.*

Faster settling takes place in less area and permits economy of smaller diameter thickeners.

SOLUTION

Spiral Rakes on DENVER *High Capacity* THICKENERS move solids to discharge in one revolution.

Completely automatic rake control handles overloads without attention and prevents damage to mechanism.

Low cost beam superstructure is used on sizes to 65′ diameter. Simplified truss or bridge type is used from 65′ to 125′.

COMPARE SPECIFICATIONS—PRICE

Every engineer planning a new thickener installation will want to study DENVER specifications. Compare sand raking capacity; shaft diameter; rugged, heavy-duty construction; totally enclosed, running in oil gears; automatic, foolproof rake lifting controls; acid-proof or standard construction; quick delivery.

You will agree the NEW DENVER *High Capacity* THICKENER more adequately meets ALL requirements of today's new thickening techniques.

"The firm that makes its friends happier, healthier and wealthier"

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

June 1956

INTERNATIONAL PANORAMA

RAY, ARIZONA—Kennecott Copper Corporation has started a major expansion program to increase copper output here by 40 percent to 70,000 annual tons. A new copper smelter is part of the program.

NDOLA, NORTHERN RHODESIA—Chibuluma Mines Ltd. has started its new 1,500-ton-per-day copper-cobalt mill here. Mine production has been underway since October 1955. Mill heads average 5.23 percent copper and 0.25 cobalt.

TEXAS CITY, TEXAS—The government's Texas City tin smelter is to be operated until January 31, 1957 so adequate time can be had to find a private buyer for the smelter.

ADDIS ABABA, ETHIOPIA—Newmont Mining Corporation and the Natomas Company have joined Goldfield Consolidated Mines Company in prospecting the Mormora River for possible gold dredging areas.

SAN FRANCISCO, CALIFORNIA—Mine production of copper in the United States in March was at an all-time monthly high of 100,272 tons.

NOGALES, MEXICO—Minerals Engineering Company has purchased control of Minas y Minerales, S. A. which owns a scheelite deposit. Minerals will develop an open-pit mine and build a 400-ton-per-day mill.

CLIMAX, COLORADO—Climax Molybdenum Company's mill expansion to 34,000 daily tons is scheduled for completion in September. Recommendations have been made to build another mill addition to raise capacity by an additional 3,500 tons daily.

NOWA NOWA, VICTORIA, AUSTRALIA—Important iron ore deposits have been discovered here. Aerial and ground surveys indicate possibility of 100,000,000 tons assaying from 40 to 65 percent iron.

CAIRO, EGYPT—Plans are being made to build the first Egyptian zinc refinery. Initial capacity will be 6,000 annual tons with provisions for expansion to 20,000. Locally mined ore will be zinc source.

ASHTABULA, OHIO—ElectroMetallurgical Company has produced its first sodium reduced titanium metal sponge at its 7,500-annual-ton plant. This is also the first United States plant to commercially produce titanium by a method other than the magnesium-reduction process.

LANDER, WYOMING—Phelps Dodge Corporation has expanded its uranium holdings in the Crooks Gap district by a lease and option on claims of the Wyoming Uranium Corporation. Phelps Dodge is to drill 68,000 feet under first option phase.

STEEP ROCK, ONTARIO—The first shipment of underground ore mined at the Errington mine of Steep Rock Iron Mines, Ltd. has been made. Plans call for 750,000 ton production this year.

WASHINGTON, D. C.—The United States Atomic Energy Commission has awarded contracts to National Distillers Products Corporation, National Research Corporation, and the Carborundum Company for 11,000,000 pounds of zirconium metal to be delivered over the next five years. Prices per pound are from $6.00 to $6.50.

BIRMINGHAM, ALABAMA—Woodward Iron Company has purchased the Muscoda underground iron ore mines from the Tennessee Coal and Iron Division of United States Steel Corporation. Woodward will reopen the mines and produce ore for its own furnaces.

KINGSTON, JAMAICA—Burrex Mines Ltd., a Canadian firm has applied for a copper prospecting permit covering 8.5 square miles in St. Catherine Parish.

TORONTO, ONTARIO—A new company—Rio Tinto Mining Company of Canada Limited—has been formed by Joseph H. Hirshorn and Rio Tinto London to operate important uranium mines, including Pronto Uranium, Algom Uranium, Lake Nordic Uranium, Panel Consolidated, and others.

Senate Committee Reveals Metal Barter Tonnages

The Senate Interior Committee has released data on the extent of the government's barter deals for foreign metals and minerals. These deals are handled by the Commodity Stabilization Service which uses surplus farm products from the Commodity Credit Corporation in exchange for foreign metals. Nearly all such deals are handled through brokers. Active bartering as of February 15 was as follows:

Antimony: Laval & Company, Inc. for 1,200,000 pounds.

Beryl: Fadex Commercial Corporation, 661 short tons; Overseas Metal and Ore Company, 744 short tons.

Cadmium: Five contracts for 1,529,570 pounds with Philipp Brothers, Inc.; W. R. Grace and Company; Overseas Metal and Ore Corporation; and Laval & Company.

Rare Earths: Two contracts for 5,000 short tons.

Fluorspar: Continental Ore Corporation, and North American Continental Corporation for a total of 215,000 tons of acid grade.

Manganese Battery Grade: Mercantile Metal and Ore Corporation for 2,500 tons.

Palladium: Three contracts for 73,000 troy ounces with M. Golodetz and Company; and Philipp Brothers, Inc.

Titanium: Philipp Brothers Inter-Continental Corporation for 2,070 metric tons.

Similar contracts were also made for ferrochromium and ferromanganese.

The sources of these contracted metals were not released.

Three U. S. Firms Seek Ethiopian Gold

Newmont Mining Corporation and Natomas Company have joined with Goldfield Consolidated Mines Company in a joint exploration venture in Ethiopia. Goldfield holds a prospecting license, with a long-term lease attached, granted by the Ethiopian government in July 1955.

The license grants exclusive right to prospect and explore for all minerals, except oil and petroleum hydrocarbons, in three areas comprising approximately 30,000 square miles. The agreement is for a period of 1½ years with option to extend exploration rights for another three years. It also includes an obligation by Goldfield to spend $100,000 annually in the exploration work.

Prospecting will be undertaken shortly by the joint group on the Mormora River where the possibility of developing a gold placer deposit suitable for dredging will be investigated.

INDEX MAP showing the location of the NYAC operation and surrounding area. Although its location in Western Alaska is isolated, daily air service brings outside world closer.

WASHINGTON IRON WORKS 4½-cubic foot dredge in operation. Note Caterpillar D-8 bulldozer at left stripping moss in preparation for dredging.

Hydroelectric Power Keeps Nyac

By HENRY G. GRUNDSTEDT
Manager, Engineering Services
Mining World

Operating a profitable gold dredging operation in Alaska during present day conditions of rising costs and stable gold price, is no mean feat. These conditions present a real challenge to management—a challenge that is being met successfully by the operating officials and management of the New York Alaska Gold Dredging Corporation (NYAC).

It would seem more factors are against a successful operation, than are for it. While the price of gold has remained the same, Alaskan freight rates have gone up; the cost of labor, machinery, and supplies have also gone up. However, NYAC is weathering this economic storm successfully, having operated at a profit since 1928, except for two years during World War II.

One of the principal reasons for this profitable operation, besides, of course, having good pay gravel, is the utilization of hydroelectric power. A saving of over 300 percent in power costs is being realized through the use of hydroelectric power over Diesel power. NYAC is the only gold dredging company in Alaska utilizing hydroelectric power.

Although basically a dredging operation, NYAC also intermittently operates two draglines. Capacity of the operation is approximately 13,000 cubic yards per 24-hour day, using three connected bucket line dredges.

The operation headquarters are at the town of Nyac, located in northwestern Alaska. Nyac is not an Eskimo name, rather an imaginative grouping of the company's initials. The town is somewhat isolated. Situated near the edge of the great Alaskan tundra, in the Kilbuck Mountain Range, Nyac is 65 air miles from Bethel, navigation center on the number two Alaskan river, the Kuskokwim.

Modern facilities at Nyac make living relatively pleasant. With a population of approximately 100 people during the operating season, the camp is completely electrified, has a Territorially operated school, a general store, motion pictures, and a trained nurse. Electric heating is the next project in store for the camp. A complete radio station and daily air service by Northern Consolidated Airlines, makes communication with the outside world quite comfortable.

Supply Problems

Before the problems of mining operation could even be considered, the supply problem had to be solved first. Supplying a town of 100 people and a large mining operation has its problems even in the United States, but add to the normal problems those of enormous distances over rough terrain, adverse weather, and high cost, and you get a small idea of what the supply problem is like. This problem, and many others also, have been successfully worked out by NYAC's president J. K. Crowdy. The majority of the freight supplying Nyac is carried from Seattle aboard steamers as far as Bethel, Alaska. Only two sailings a year, three months apart, further complicate the supply problem and necessitate carrying large inventories of all types of supplies and merchandise. From Bethel it is shipped by air to camp. Over 500 tons per year are flown into Nyac. Although it may seem strange to the uninitiated, at times it is cheaper to fly freight to Nyac from Seattle than to utilize the steamship line. This is due to the fact that the steamship lines charge on the basis of weight or volume (whichever is higher), while the airlines charge on a weight basis only. Therefore it can be seen that bulky, lightweight articles, such as certain grocery items, can be shipped much cheaper.

An interesting sidelight on the freight problem may be received by

A VIEW OF THE VALLEY containing NYAC operations. Piled gravel in foreground has already been worked by dredge at far left. Sparse vegetation simplifies stripping.

LIFTING OUT BLOCKS of ice from frozen dredge ponds with a dragline. Early spring still finds ponds frozen. Ice is sawed into blocks and lifted from pond on to the shore.

Gold Placer On A Paying Basis

following the path of NYAC's most recently acquired number four dredge from its purchase site, Weaverville, California, to Nyac, a distance of over 2,350 miles. The Washington Iron Works dredge was purchased at Weaverville in January 1953. A few members of the summer crew from Nyac were sent to Weaverville to disassemble the 4½-cubic foot, pontoon type dredge and prepare it for shipping. In August 1953, the disassembled dredge was trucked to Seattle, Washington. This phase of the operation involved 28 truckloads carrying an overall load of 400 tons. In Seattle a chartered tug and barge hauled the dredge and additional freight, amounting to approximately 650 tons, to Bethel, Alaska. At Bethel a river steamer pushed the barge up the Kuskokwim River to Akiak. At this point a crane unloaded the barge, and the freight left until winter. During the following winter the material was hauled 50 miles cross-country to Nyac by tractor trains. The trains consisted of a Caterpillar D-8 tractor, two steel logging type sleds, and a radio-equipped caboose. Twelve trips were required to move the total load. The following spring the dredge was reassembled and the summer of 1954 found the dredge in operation.

Hydroelectric Plant

Economic power derived from the company's hydroelectric system does much to keep it on a profitable basis. Water to supply the plant is received from an open ditch connecting the nearby Tuluksak River. This water is fed into turbines which supply approximately 900 kw at 4,160 volts. The power is distributed over nine miles of aluminum transmission line. Aluminum lines were chosen because of their relatively low cost, light weight, and ability to be suspended on fewer poles. Additional standby sets generating an additional 450 kw include two Caterpillar and two Fairbanks-Morse Diesel-electric sets. Transformers on the dredges step down the power to 440 volts. As can be well imagined, cold weather poses quite a problem in keeping the hydroelectric water supply lines open. Several excellent methods were developed by company officials to help ease this problem. Freezing, both within and at the head of the 4- and 5-foot-diameter pipelines, connecting the ditch with the turbines, was always a serious problem. To keep the trash screens at the head of the pipelines from freezing, the screen was constructed from ¼-inch electrical conduit connected to a 300-amp arc welder. The welder, when turned on, supplies enough heat to keep the screen open. Another device, designed to keep the two turbine intake pipes free from ice, consisted of running a steam hose a small way down each pipe. Company engineers found that a 15-hp boiler at the head of the pipes would supply enough steam at 4.0 pound per square inch to keep both pipes from freezing. About 137,000,000 gallons of water per day flow through the 550-foot-long pipes. A 71-foot head provides more than enough grade for sufficient water velocity.

At times, during early spring and late fall, the stand-by Diesel-electric units are utilized because of freezing and water shortages, respectively. If Diesel electric units were used constantly, a daily Diesel fuel bill of over $400.00 would be incurred. This would amount to about $0.05 per kwh, as compared to $0.01 per kwh for hydroelectric power, making the difference between profit and loss on the operation. In excess of 2,000,000 kwh are produced each season.

Maintenance Starts Early

General maintenance and overhaul where needed are usually started in

WILLIAM H. RACE, NYAC resident engineer, is shown pouring molten gold into a mold in preparation for shipment. Upon cooling a 400-ounce gold brick results which is then shipped to the mint in Denver or San Francisco.

early spring. At this time three dredges, Washington Iron Works 2-, 6½-, and 4½-cubic-foot dredges, are prepared for the approaching season. Also thoroughly inspected and prepared are Northwest, and Bucyrus-Erie draglines, six Caterpillar tractors, one International TD-18, and one International TD-40. The full crew spends approximately two to three weeks on this phase of the operation. This preventive work insures an operating efficiency of about 95 percent throughout the entire season of 24-hour, seven days per week operation. Preparation is facilitated by a complete machine shop, warehouse, repair shop, and over 20 miles of privately maintained roads connecting various phases of the operation. The camp is entirely self-sufficient in regard to repair and overhaul facilities.

Mining Operation

Planning the season's mining operation is greatly facilitated by subscription to the Irving P. Krick weather forecasting service, of Denver, Colorado. Accurate long range forecasts are given the company in the spring and fall, enabling them to determine starting and closing dates of the mining season. This also helps the operators foresee the weather conditions in which they will be working.

Many advantages have been derived from this service, the main one being that adequate preparations may be taken beforehand in the event of foul weather.

Ground preparation before mining is not too much of a problem. There is no permafrost to be contended with at Nyac. Stripping consists simply of removing small amounts of brush, moss, and trees, with a bulldozer, down to the gravel. After the gravel, which is quite close to the surface, has been reached, the dredge takes over and mining begins.

Typical Freight Costs Per Pound, Incurred by the New York Alaska Gold Dredging Company, Nyac, Alaska, during 1955.

Commodity	*Steamship to Bethel, Alaska; Air from Bethel to Nyac, Alaska*	*Steamship to Seward; Rail to Anchorage; Air Anch. to Nyac*	*Air Seattle to Nyac*
Dredge parts and other general mining machinery	$0.05	$0.16	$0.32
Furniture	.19	.19	
Oxygen & welding supplies	.052	.16	
Misc. hardware	.053	.18	
Lumber	.056	.17	
Flour	.064	.17	
Canned foods	.054	.17	
Toilet paper	.134	.175	
Post Toasties[1]	.21	.19	
Potatoes	.065	.20	
Chevrolet sedan[2]	0.13		

1. Note that it cost over four times as much to ship light, bulky, Post Toasties, by steamship from Seattle, than it does to ship the heavier and less bulky mining machinery.
2. Sedan shipped via steamship from Seattle to Bethel, Barge from Bethel to Akiak, and tractor train from Akiak to Nyac.

The commencement of mining operations in spring still finds the dredge ponds covered with thick ice. This must be removed prior to the actual dredging operation. Ice is cut into large squares by either a chain saw or a steam cutter. A 1½-yard Bucyrus-Erie dragline with extended chains on the bucket then lifts the frozen blocks from the pond. With the pond free from ice, the dredging operation is started. The conventional type pontoon dredges dig approximately 32 feet of pay gravel. You will note from the photographs that the entire dredge is enclosed. Blowers circulate hot air from steam heaters throughout the entire structure, thus preventing any time-consuming freeze-ups.

Conventional recovery methods are used aboard the dredges. The gold-bearing gravel flows through a trommel screen, with ¾- to ⅞-inch perforations, and then on to tables and over rubber covered riffles. Nugget slots, for the fast passage of gold nuggets through the circuit are used at the lower end of the screen. These nugget, or draw slots, are ¾ inch wide and 2½ inches long. Nyac gold varies in size from fine to approximately ½-ounce nuggets, and is easily amalgamated.

Cleanups are held on the dredges every 10 days. The amalgam is removed from the dredges, and run through a retort to recover the mercury. The gold sponge is then melted and poured into molds, resulting in approximately 400-ounce bricks. This gold is 920 fine, and is shipped to the Denver, Colorado or San Francisco, California mint.

Explore Ahead

Running concurrently with the mining program, is an extensive exploration program. Gravel reserves are kept approximately 10 to 12 years ahead. Sampling is done on a regular grid pattern with a Kirk-Hillman 6-inch churn drill. The cuttings are then panned and weighed. Nyac engineers have found the cutoff point in the 32-foot thickness of pay gravel to be approximately $0.35 per cubic yard. They have also found the width of the pay gravel extends roughly the entire width of the valley, which is about one mile. The majority of the gold is found near the bottom of the pay gravel near and well into the igneous bedrock. Barren spots do occur in the

valley, and this necessitates the moving of a dredge over ground from one pond to another.

Moving Dredge Overland

These moves are planned well in advance. At the close of the season, prior to the move, a shelf is dug on one side of the pond by the dredge itself. The gantries, spuds, stacker, and ladder, as well as the bow section pontoons, back as far as the house, are removed. The water level is then lowered and a go-devil sled, 30 feet wide and 65 feet long, with runners spaced 19 feet apart, is placed on the shelf. The water level is raised back to normal. The hull sections are then floated on the runners, the water level again lowered, leaving the hull free to be dragged to its new location by tractors, where the procedure is reversed to float the hull again. One advantage of the pontoon type dredge is the relative ease with which it may be moved, and also can be enlarged. A situation such as this occurred recently at Nyac, involving the moving of a dredge hull 48 by 100 feet. The sled load weighed 400 tons, and required seven tractors to drag it to its new location.

Mining operations at Nyac usually stop sometime during the late fall, depending on the weather. A small crew is kept on during the winter months to haul freight, and to do general maintenance work.

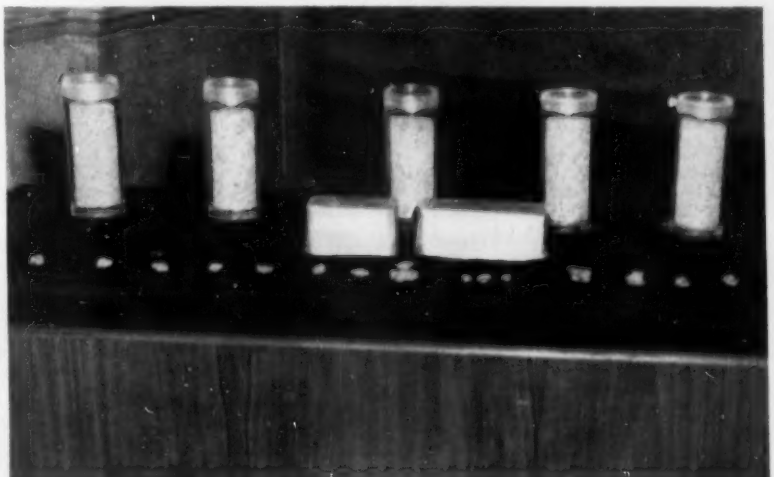
There's the picture of the Nyac placer. Operations such as this will do much to bolster the Alaskan economy and aid in making the Territory self-sufficient, should government defense expenditures in Alaska ever cease. Much credit should be given to the men with stamina enough, and concern over the future of the Territory, to continue operating in the face of rising costs and unchanging price of gold. The existing gold situation as seen in the eyes of the operators may be summed up by a statement recently made by NYAC's president, J. K. Crowdy: "Don't tell a man he is worth his weight in gold, as presently this would hardly be complementary to the individual."

Aggressive Exploration Policy

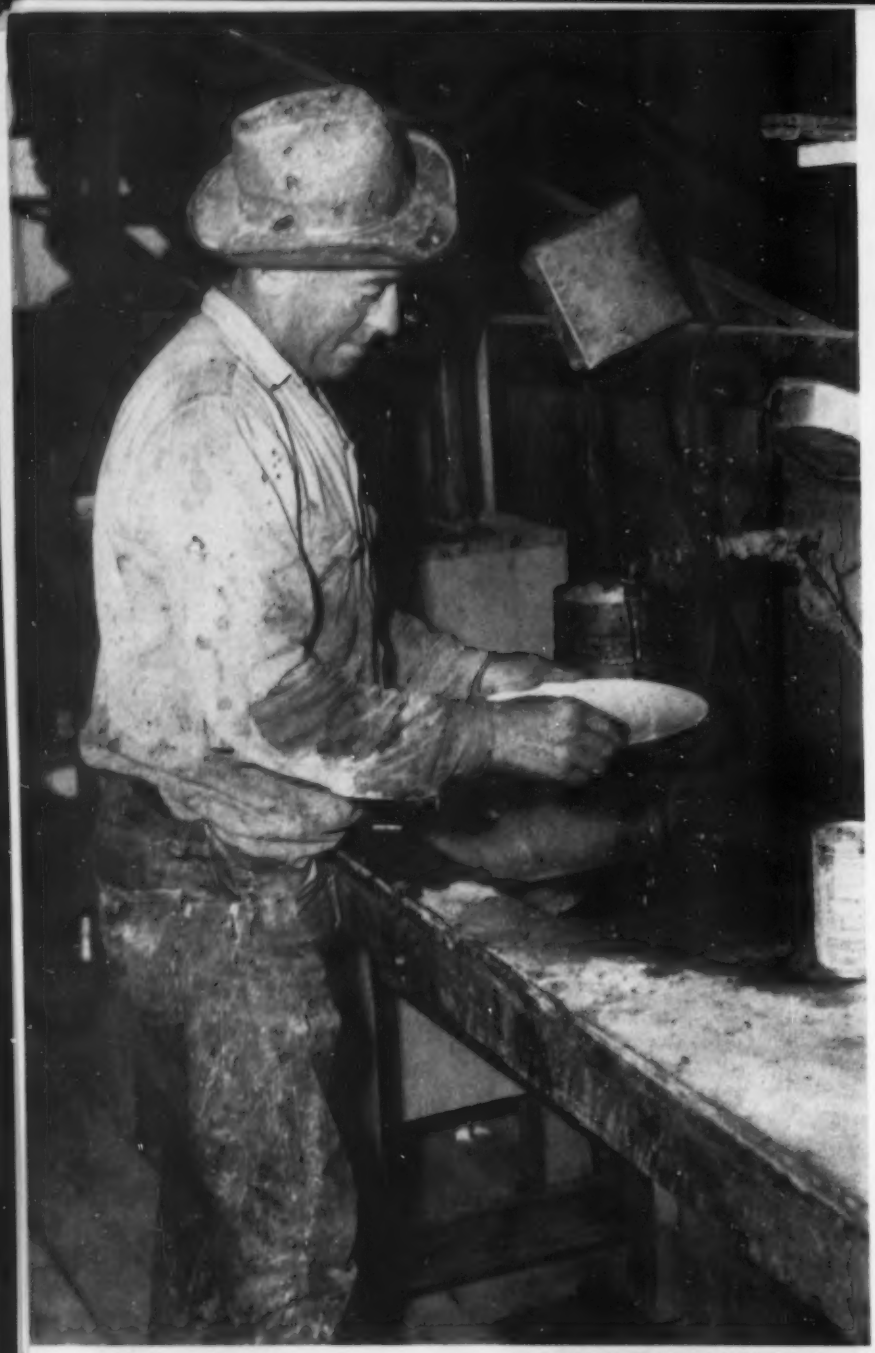
In view of the existing gold situation, the company's aggressive policy has led it to active exploratory work outside the Alaskan Territory also. NYAK is presently, in conjunction with Pioneer Gold Mines of B.C. Ltd., engaged in exploration work in British Columbia, Northwest Territories, and the state of Utah. Uranium, gold, copper, and base metal properties are their prime target.

SOME OF THE OPERATING OFFICIALS of NYAC are shown above. Reading from the right are: J. K. Crowdy, President; M. F. Bailey, Assistant Manager; William H. Race, Resident Engineer; and L. E. Robbins, Office Manager and Purchasing Agent.

MOVING THE DREDGE overland to a more suitable site. Manipulation of the huge dredge is done by controlling the height of the water level in the pond, floating dredge onto steel runners, and towing away with four tractors.



THE ABOVE ASSEMBLAGE of gold was displayed by the New York Alaska Gold Dredging Company, in the Seattle First National Bank during 1951. Note the two gold bars. They were specially assayed to emphasize the difference in purchasing power of gold between 1870 and 1951. The smaller brick weighing 303.13 ounces would at the 1870 price of $20.67 per ounce have the same purchasing power as the larger brick weighing 442.63 ounces at the 1951 price of $35.00 per ounce. The total value of both bricks at today's price is $24,045.76.



Linka Mill

With the termination of the Federal government's tungsten buying program Linka like many other western producers has been forced to close. However, Linka is remodeling so that it can treat custom ores of many kinds awaiting Congressional action on any one of several bills to save the domestic tungsten industry.—Ed.

On August 15, 1955, Consolidated Uranium Mines, Inc. placed a brand new 350-ton (daily capacity) tungsten mill in operation 26 miles east of Austin, Nevada which includes these standout features:

- A simple but highly efficient flowsheet.
- An unusually good recovery of tungsten in a specification meeting high-grade concentrate by a single tabling operation following flotation.
- A new project started approximately one year before the expected termination of government tungsten purchases.
- A mill circuit connected with plastic pipes.

The concentrator, now treating production from Consolidated's Linka Division, is the most recent link added to Nevada's growing chain of tungsten operations.

The metallurgy of the fine-grained scheelite ore, in which sulphides occur only in minor quantities, was worked out by the Booth Company, Inc., of Salt Lake City, Utah. The process is based on flotation, followed by tabling. The flotation circuit includes roughing, scavenging, and three-stage cleaning. The pulp is conditioned with reagents each time before it is advanced to roughers, scavengers, or cleaners.

The froth from the final cleaner cell is fed to a Deister table which makes

QUICK CHECK of mill performance is made by mill operator Joe Dohmes, above, by panning a tailing sample which he then scans with ultra violet light.

FINISHED HIGH GRADE concentrate and a saleable low grade product is taken from the Deister Concentrator Co. table shown in the picture at far right.

SCAVENGER CIRCUIT, center, returns a middling to flotation roughers. Cells in left background are Booth machines; those at right are Fagergrens.

GRINDING INSTALLATION at the Linka mill includes the Marcy No. 75 ball mill in closed circuit with the Wemco 48-inch classifier shown at the right.

Added to Nevada WO_3 Output

a finished concentrate containing plus-60-percent WO_3, and a saleable low-grade product averaging 6-percent WO_3. Fifty percent of the tungsten in the flotation concentrate is channeled to the high-grade product by the table. The table tail (the 6-percent concentrate) contains the remaining 50 percent. This very excellent separation obtained on only one table is to Consolidated Uranium one of the most pleasing characteristics of the mill.

Plastic Pipe

The concentrator was designed and built under contract by the O. W. Walvoord Company of Denver, Colorado. Plastic piping, used throughout the mill, solved a number of piping problems which usually occur during any mill construction project. Why? Because the pipe is easy to install and connections are simple to make. The ends of the plastic pipe may either be threaded or swagged for joining two sections. Thus pipe couplings can be used if desired. If swagged, a 3-inch plastic pipe can be joined to a standard three-inch pipe simply by slipping the belled section over the end of the standard pipe. Examples of both methods are found at the Linka mill. Wide sweeping curves can easily be made with a single length of pipe. However, if sharp bends are required, the plastic must be heated. Corrosion and abrasion resistance of the pipe at the mill have been very good.

One of the most encouraging aspects of this new operation is the fact that it opened approximately one year before the expected expiration of the government buying program for tungsten concentrates. This seems to indicate that a relative newcomer to the tungsten industry apparently feels enough confidence in the future to make the capital outlay required for the new plant.

The new mill also features standby pumps and generates its own power. A second pump, provided at every single installation except one, will reduce down-time caused by failure or need for making repairs. Spare Diesel-generator sets will insure a steady source of electricity. Austin Nolan served as general foreman for the O. W. Walvoord Company and Fred T. Mathews of H. M. S. Milling Company acted as project manager for Consolidated Uranium during construction.

Linka Mine

The bulk of the production which the new mill is treating is coming from the underground Linka mine, located about ½-mile south of the mill. The scheelite occurs in a tactite deposit which has been traced for a considerable distance on the surface and explored for 500 feet along the strike underground. The deposit trends approximately north 50° east along a contact zone between granite on the footwall and limestone on the hanging wall. The dip is steep, being about 70° to the southeast. The width ranges from 40 to 70 feet.

Reagent Table Consolidated Uranium Mines, Inc. Linka Division Tungsten Mill

Reagent	*Function*	*Amount and Method of Feeding*
Sodium silicate	Dispersion	5 percent solution in water
Palcotan	Lime depressant	10 percent solution in water
D-40	Frother	5 percent solution in water
Cyanide	Cleaning reagent	10 percent solution in water
Reagent 710	Collector	20 percent solution in water
Oleic (red oil)	Collector	100 percent
Soda ash	pH control	Dry 100 percent
Aluminum sulphate	To kill cleaner frothers for tabling	Dry 100 percent

The mine is opened by a vertical, three-compartment shaft with a manway and two hoisting compartments. All of the production is coming from the 150 level. The ore is extracted by shrinkage stoping and reclaimed from drawpoint loading areas with Eimco 12B Rocker Shovels and Gardner Denver muckers. Ingersoll Rand stopers are used to drill stope rounds and air-legs are used to drive development headings.

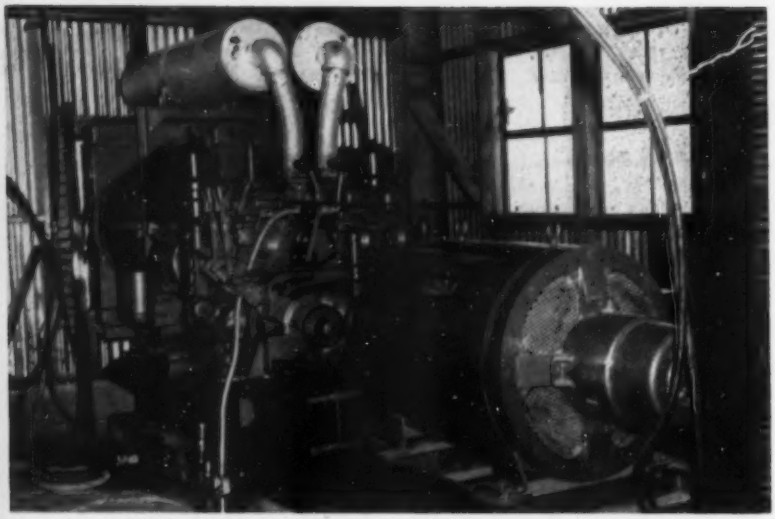
The production gathered at the drawpoints is trammed to the shaft in one-ton cars which are loaded on a cage and hoisted to the surface. The mine cars taken off the cage at the surface are dumped into a 175-ton ore bin.

Consolidated Uranium Mines, Inc. also have several other tungsten properties throughout Nevada, some of which are under development and being brought into production. They control the Gun Metal Mine at Mina, Nevada and the North Tem Piute mine near Wah Chang Corporation's Lincoln operation.[1] It is planned to treat the ore produced at these holdings in the Linka mill.

Crushing

The mine ore is hauled by truck about half a mile to the 175-ton coarse ore bin at the mill. A feeder draws the muck from this bin and discharges to a 15- by 30-inch Pacific jaw crusher which reduces the material to a 2-inch size. The ore drops to a conveyor, is

[1] Low Mining Costs Spark Growth at Wah Chang's Nevada Operation, October 1955 Mining World, Pages 46-50.



HEWITT ROBINS SCREEN, at left, scalps undersize from feed to the 3-foot Symons crusher, the top of which is just visible. Above, a General Motors twin-Diesel-generator set (one of three) furnished power for the mill. These units are synchronized through a stack pyrometer so that each carries an even load.

transported over an Eriez magnetic head pulley, and fed to a Hewitt-Robins screen fitted with a woven wire deck containing ⅜-inch openings. This screen scalps the undersize fraction from the feed to a 3-foot Symons shorthead crusher which is set at ½-inch. The final crushed product is conveyed to a 175-ton fine ore bin serving the grinding section.

Lime and Phosphorus

Though the ore contains scheelite which is fine grained, little or no sulphides are present. The lime content is quite high and appreciable quantities of phosphorus occur. The amounts of these two impurities however, have been reduced below specification limits in the high-grade concentrate. Since sulphides are not bothersome at the Linka mill, the ore, after grinding, can be directly conditioned for tungsten flotation. Provision has been made in the circuit to adequately handle sulphides without additional equipment installation if they should be encountered.

Grinding

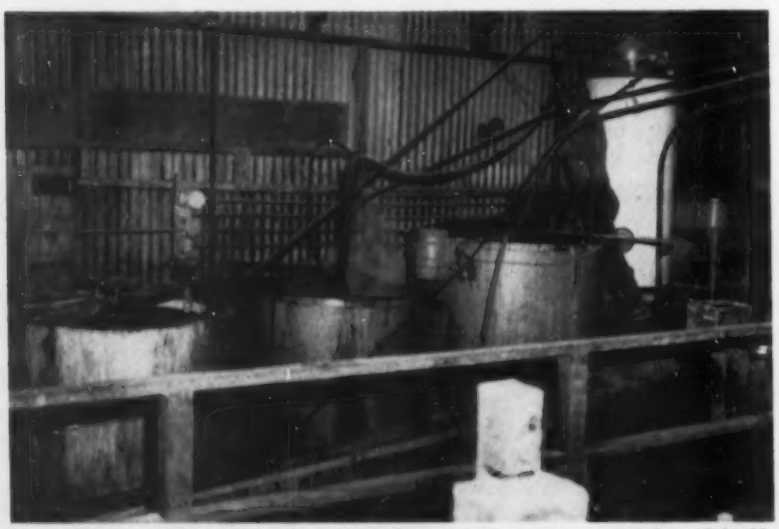
A Hardinge constant weight feeder removes ore from the 175-ton bin and discharges to a conveyor feeding a Number 75 Marcy ball mill. Dry soda ash for pH control is added to the ball mill feed. The grinding unit is in closed circuit with a Western Machinery Company 48-inch spiral classifier. An ammeter hook-up on the ball mill motor circuit helps control the grinding load. The operators govern the feed rate according to the meter readings.

The classifier overflow, containing 55 to 60 percent minus-200-mesh particles, is pumped into the first of two conditioners serving the rougher flotation section. In the first unit, a Denver Equipment Company 6-foot by 6-foot conditioner, sodium silicate (for dispersion), palcotan (a lime depressant), and red oleic oil (a collector) are added. In the following Wemco 4- by 4-foot conditioner, Dow Chemical Company D-40 (a frother) and reagent 710 (a collector made by American Cyanamid) are introduced.

Roughing and Scavenging

After the second conditioning stage, the pulp flows to the rougher flotation section consisting of two, 3-cell Fagergren flotation machines arranged in series. The froth from the first three cells reports to a set of Booth flotation cells for the first cleaning step. Concentrate from the last three Fagergren flotation is pumped back to the conditioners at the head of the rougher section.

The rougher tailing is pumped to another 6- by 6-foot Deco conditioner at the head of the scavenger circuit. At this point additional red oil is again fed to the pulp which then enters a two-cell bank of Fagergren 44-inch flotation machines. The concentrate from these cells is recycled back to the rougher section. The tailing from the first Fagergren scavenger units flows to a set of four Booth flotation cells where more reagent 710, red oil, and D-40 are added. These Booth cells make a scavenger middling, which returns to the conditioner at the head of the scavenger circuit,



FLOTATION REAGENTS for the Linka mill are mixed in one corner of the mill building. Only soda ash, red oil and aluminum sulphate are fed in the dry or in natural 100 percent strengths. Others are introduced in water solutions.

Flowsheet*
350-Ton Linka Tungsten Mill, Consolidated Uranium Mines Inc.
Austin, Nevada

LEGEND

Grinding-Classification

1. Marcy 75 ball mill.
2. Wemco 48-inch classifier.
3. Pulp sampler.

Flotation (Rougher)

4. Sand pump, 4-inch.
5. Deco conditioner, 6- by 6-foot.
6. Wemco conditioner, 4- by 4-foot.
7. Two, 3-cell Fagergren (roughers).
8. Four, 44- by 56-inch Booth (cleaners).
9. Deco conditioner, 3- by 4-foot.
10. Sand pump.

Flotation (Cleaning)

11. Two-cell Deco No. 15 (cleaner).
12. Three-cell Deco No. 18 (cleaner).
13. Deco conditioner, 3- by 4-foot.

Tabling

14. Deister table.
15. Sand pump.

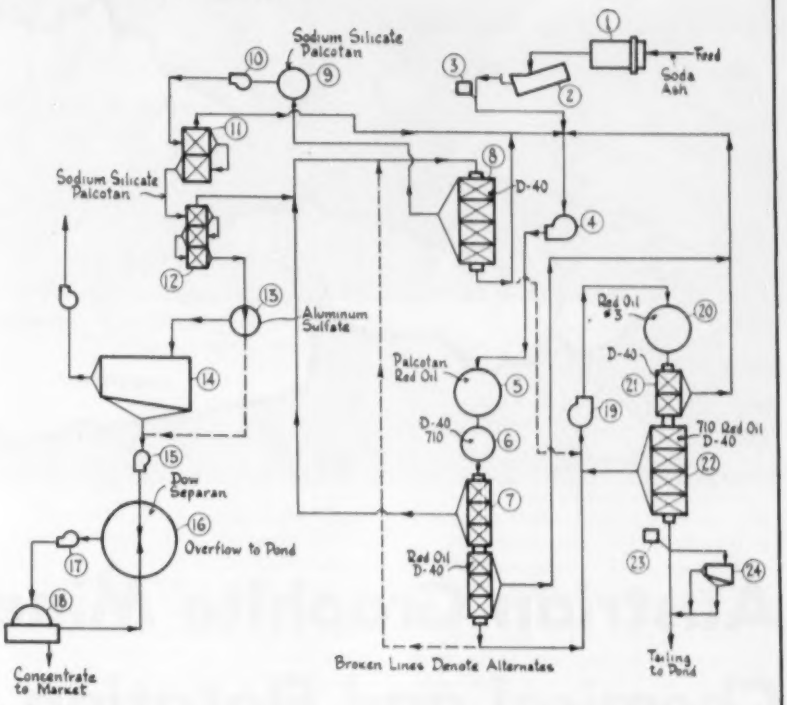
Thickening-Filtration

16. Dorr 16-foot thickener.
17. Pump.
18. Deco 4-disc filter.

Flotation (Scavenging)

19. Sand pump.
20. Deco conditioner, 6- x 6-foot.
21. Two-cell Fagergren 44-inch.
22. Four-cell Booth 44-inch.
23. Pulp sampler.
24. Pilot table.

*Reagents and points of addition are indicated thusly ←—— Soda ash.



and a finished tailing. A portion of the finished tailing is bled off and passed over a small pilot table for visual inspection of milling results.

Cleaning

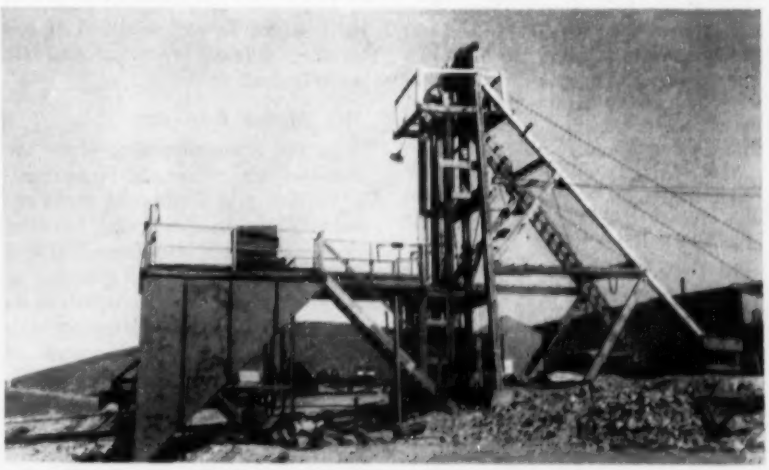
As mentioned previously, the froth from the first three rougher cells flows to a set of four, Booth, 44- by 56-inch cells. This installation was originally placed in the mill to remove any sulphides from the classifier overflow. However, mining operations have not encountered accessory sulphide mineralization in the tungsten ore to any extent as yet, so the Booth cells were converted to duty in the cleaner circuit. The tailing from the Booth cleaners returns to the conditioners serving the rougher section. The concentrate is pumped to a Deco 3-foot by 4-foot conditioner ahead of the final cleaner units.

Three solutions containing sodium silicate, palcotan, and sodium cyanide are added to the Denver conditioner, and the pulp then flows to a two-cell Denver No. 21 flotation machine. A second set of 3 Denver No. 15 flotation cells completes the cleaning section. In these two sets of flotation machines, the froths are advanced successively through each of the five cells for recleaning. The cleaner tailing from the first bank of machines returns to the head of the rougher section, and the tailing from the second bank of cells is recycled within the cleaning system.

Tabling

The concentrate from the final cleaner cell is conditioned with aluminum sulphate which kills the froth

Continued on page 63 (WM57)



ORE HOISTED through the vertical, three compartment shaft in 1-ton cars is dumped in the 175-ton steel bin. The mine shaft is located about ⅛-mile south of the mill, and production on the 150 level is gathered from shrinkage stope drawpoints.

Austrian Graphite Miners Use New Chemical and Flotation Methods

By H. SPATZEK, and G. FRANK*

A new chemical plant capable of concentrating microcrystalline graphite to yield a concentrate assaying 99 percent carbon has gone into operation at the Kaisersberg mine in Styria, Austria. The Kaisersberg mine had previously been the scene of the first commercial flotation process in the world for producing up to 90 percent carbon from cryptocrystalline ore. Both of these developments came about in post-war Austria with the aid of ERP funds which were used to modernize many mines and mills in Europe after World War II.

Austria ranks as one of the world's important graphite producers, normally producing about 10 percent of the world output. Two distinct zones of graphite-bearing rock are found in the country. The larger is found along the eastern foothills of the Alps, while the other extends from Czechoslovakia south into the valley of the Danube. The graphites differ as to their geological environs, but are of identical origin. They were formed by metamorphism of bituminous or other carboniferous matter.

Depending on geological environ as well as degree and condition of formation, different types of graphite were formed.

The Alpine Deposits

In the alpine deposits, where the metamorphic conversion of carboniferous into graphite-bearing rocks occurred at comparatively shallow depths and the schists formed in that process remained finely granular or scaly in texture, graphite occurs in its typical microcrystalline (cryptocrystalline) variety, earthy and opaque in appearance.

These graphites previously have been termed amorphous, like the ones from Mexico and Korea, and from a commercial viewpoint still are designated "amorphous." Modern science, however, proved that all graphites are crystalline. The crystal structure of the "amorphous" type has been discovered through Debye-Sherrer Diagrams and became visible by use of the electronic microscope.

While frequently the original anthracitic texture is retained, there are not even traces of coaly matter present in the material which represents a genuine and perfectly graphitized graphite of clearly defined microstructure.

Apart from the anthracitous variety, which is characterized by hardness and carbon content in the range of 80 percent and above, a second type occurs, distinguished by its softness and plasticity as well as by carbon content of generally about, and up to, 60 percent.

Invariably the deposits in the Alps are found in large zones of phyllite and in places are so rich in graphite that workable beds in thicknesses of up to several meters are encountered. This zone of graphite-bearing rocks begins at the Semmering and leads southwest as far as the mouth of the Liesing Valley; from there, it swerves north-

*Messrs. Spatzek and Frank who wrote this special report for MINING WORLD are chemical engineers for Grafitbergbau Kaisersberg, Franz Mayr-Melnhof and Company, Vienna, Austria.

west and gradually peters out. According to the type of rocks in which the graphites occur, their content in minerals consists—in varying proportions—of varieties of the mica group (muscovite, biotite, sericite, chlorite, chloritoide) and quartz, further of plagioclase feldspars, hornblende, tremolite and limonite. In addition there are minor proportions of rutile, zircon, ilmenite, titanite, tourmaline, and apatite. The content of pyrite and limestone as well as other sulfides and carbonates is practically nil, which is the main reason for the excellent suitability of these graphites for all applications in the iron making and iron working industries.

Austrian Graphite Mines

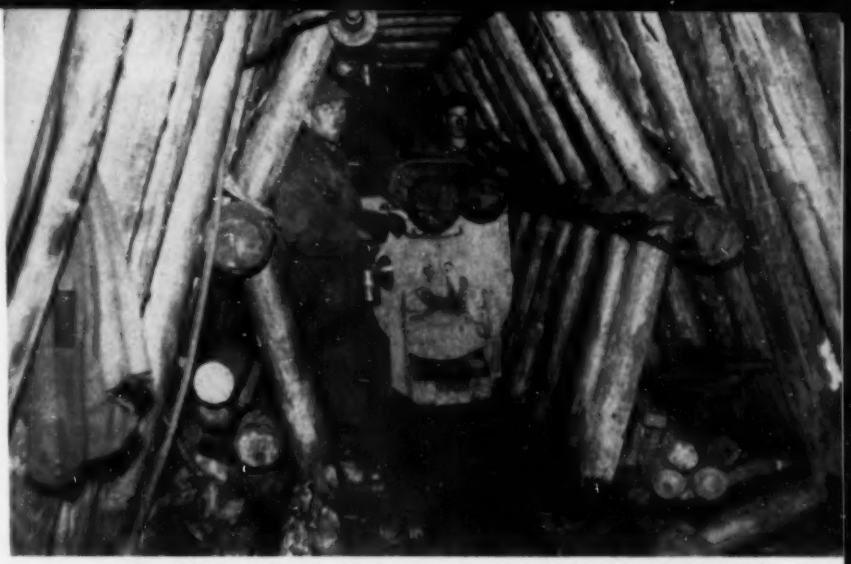
For more than 100 years three graphite mines have been operated. Two are located in the mountainous tracts of Styria, and the third has been established in the Danube Valley, in the province of Lower Austria.

The largest and best known of these is the Graphitbergbau Kaisersberg of the Franz Mayr-Melnhof Company. This company which has been in operation since 1840 controls 1,865 acres of mining rights. It is a large industrial enterprise. In addition to mines and large forest estates, the firm possesses Austria's biggest and most up-to-date saw mill, a paper and cardboard mill, a plywood (Novopan) factory, and a number of limestone quarries and calcining plants.

By far the largest graphite mine in Austria, Kaisersberg produces about 11,000 metric tons of saleable product per year. The deposit has been developed so as to give access to some 400,000 tons of graphite-bearing material. However, the reserves of the deposit are estimated at well over 5,000,000 tons, which is greater than any other European deposit.

The Kaisersberg mine is located just off the main valley of the Mur River at an elevation of 2,100 feet above sea level. The mine has been developed at a point where the graphite-bearing rocks turn in a northwest direction so that several separate beds have been folded together to give combined thicknesses up to 40 feet.

The beds strike from northeast to southwest and dip 50 to 60° north. The footwall of the graphite beds consists of graphitic schists and a scaly quartzite low in feldspars, while the hanging wall is formed by phyllites and quartzites rich in feldspars. Frequently the graphite beds are interrupted and cut by barren rocks to such an extent that the bed is not maintained in its original form, but consists of a more or less continuous string of pockets and nests of varying size.



HIGH ROCK PRESSURES necessitate this special type of timbering in drifts and crosscuts. Polygonal sets are placed inside 3-piece drift sets.

Mining Methods

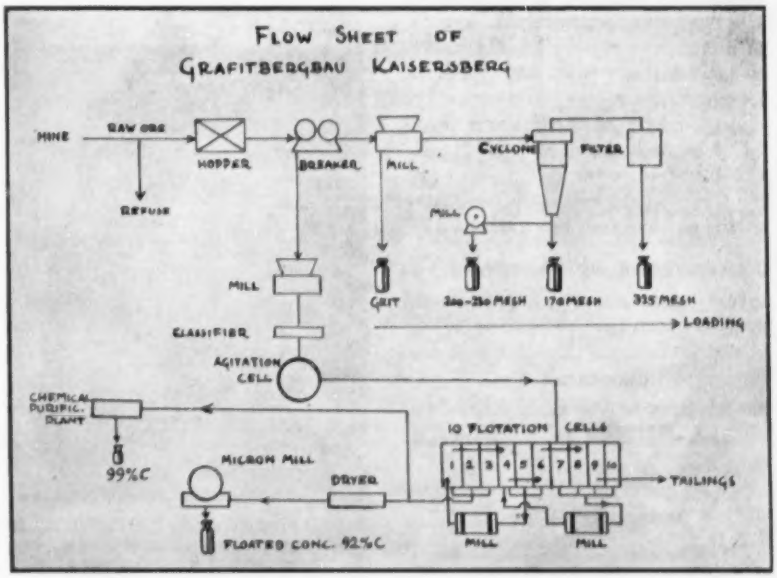
The mine is developed by three adits. Drifting along the strike develops the pockets; then crosscutting across the full width follows. Stoping is by a series of cross slices from back to floor. After extraction of a slice, the back is allowed to fall in. Work at the face is done by jackhammer and/or hand pick. For development in hard rock, blasting is resorted to. Under normal conditions square timbering is employed, and polygon supports are used wherever higher rock pressure is encountered. Parts of the main haulage are supported by steel arching.

Material mined on higher levels is gravity-chuted onto the main haulage level, collected, and hauled to surface in cars.

Preparation and Processing

The carbon content of the run-of-mine ore varies from 30 to over 80 percent, the average being from 50 to 60. Present policy is to dump any material containing less than 30 percent carbon.

While still in the mine, the broken material is hand-picked in a rough-and-ready way to give hauling lots varying in carbon by about 10 percent each. This pre-sorted ore is then transferred to the crushing and grinding plant. This consists of three self-contained units complete with crushers, elevators, conveyors, oscillating screens, drying equipment, and grinding mills. There are in operation two LÖSCHE mills, models 8 and 10, and



PORTAL OF ADIT at Graphitbergbau Kaisersberg with H. Spatzek, plant superintendent and co-author of this report, on the right. At far left is mine superintendent Heinrich Neuner.

one Raymond ball mill. Depending on particle size, the production of these mills is up to 3.5 metric tons per hour.

The run-of-mine ore contains from 5 to 10 percent moisture, which is reduced to 0.2 to 0.4 percent in the dryers. Discharge of products from the grinding mills is by air pressure. By close control of air flow the particle size of the ground material can be regulated. Separation of graphite dust from the conveying air is effected in cyclones and bagfilter batteries. Standard particle sizes are as shown in Table No. I.

The ground product is packed in 4-ply paper, or bituminous paper bags and shipped. For oversea shipment the bituminous bags are given an extra jute bag cover for protection. Transfer of products to railway loading station is by aerial ropeway 900 yards in length.

An analysis of Kaisersberg Type CG graphite is shown in Table No. II. Chief customers for this product are the iron and steel industry and tramway companies (rail lubrication).

Concentration by Flotation

For many special applications, graphite, even with carbon content of over 80 percent, is unsuited because of the presence of too high a percentage of abrasives in the form of accompanying minerals. To separate such undesirable proportions of the gangue, viz. quartz, feldspars, hornblendites, etc., from the graphite, a specific flotation method was developed at Kaisersberg.

While the flotation of flaky graphites is quite conventional today, attempts to submit cryptocrystalline material to the same treatment has generally been unsuccessful.

From years of extensive work, the research laboratory at Kaisersberg, in close cooperation with the Applied Geology Branch of the Vienna Technological University, has developed a method permitting flotation of "hard-to-float" graphite on an economically sound basis. The process has been the subject of patent applications, and patents have been taken out.

Best results are obtained from treating a 60 to 70 percent carbon graphite ground to an optimum size. This material is mixed with water in large vessels to give a predetermined solid/water ratio. Upon addition of conventional type frothers and collectors, the pH 8-pulp is passed through 10 flotation cells. The discharged sludge is a concentrate containing 90 percent carbon. After separation from adhering medium the sludge passes through a dryer and is consequently processed in a special mill designed by the company to give grinds with a fineness of: Type P, about 60 percent of all particles smaller than 10 micron, 10 percent below two microns; Type MP, about 90 percent smaller than 10 microns, 30 below two; and Type MPL, 90 percent smaller than six microns, 40 percent below two. Characteristics according to Blaine are: P 25,000 cm^2/g; MP 35,000 cm^2/g; and MPL 50,000 cm^2/g. A chemical analysis of Type F floated graphite is in Table No. III.

What gangue remains in the concentrate consists almost entirely of mica, whose crystal structure is so similar to that of graphite that it does not impair the smoothness and continuity necessary for a serviceable graphite film. For most applications this feature is of first rate importance.

This type of high-carbon, microcrystalline, deep-black graphite represents an entirely new and versatile product on the market. Its main use today is for a black pigment in the paint and lacquer industry, in the production of pencils and gunpowder, and in lubrication where it is used with dry, oily, and watery media.

In order to meet the ever increasing demand for high-purity graphite, the Kaisersberg research laboratory investigated all feasible approaches toward complete elimination of foreign mat-

Table No. I

Particle Sizes of Dry Ground Graphite at Kaisersberg, Austria

Oversize Percent	*Sieve No. (DIN)*	*Mesh Number (DIN)*	*Mesh Number (ASTM)*
5	30	900	70
5	70	4,900	170
5	80	6,400	200
5	100	10,000	230
5	130	16,900	325

CRYPTOCRYSTALLINE GRAPHITE is floated for the first time at Kaisersberg by a new method in 10-cell machines.

Table No. II

Average Analysis of Kaisersberg Type CG Graphite and Analysis of Ash in Type CG

Graphite Constituent	*Percent*	*Ash Constituent*	*Percent*
Carbon	66.22	SiO_2	56.60
Ash	31.30	Fe_2O_3	4.08
Moisture	0.28	MgO	1.29
Hydroscopic moisture	2.69	Al_2O_3	32.54
Sulphur	0.34	CaO	0.71
		K_2O	3.82
		Na_2O	1.43

ter. After satisfactory and promising results achieved last year, a chemical purification plant was designed and is now being completed. This new plant will be put in operation shortly and is expected to furnish concentrate of over 99 percent carbon.

A. R. Miller's Graphiterke

This mine is about 1.8 miles south of the town Trieben at an elevation of 3,960 feet above sea level. The deposit forms part of the strata of carboniferous rocks in the northern greywacke zone of the Alps. The deposit comprises several graphite beds varying in thickness from a 5-foot average to a 10-foot maximum. The beds strike uniformly northwest and dip to the southeast. The geological conditions as well as the accompanying minerals closely resemble those at Kaisersberg, the only difference showing in higher proportions of quartz and lower percentages of mica. Mining today is through a 3-level main adit with drifts driven on the strike. Interconnection

Table No. III

Average Analysis of Kaisersberg Type F Floated Graphite

Constituent	*Percent*
Carbon	90.80
Ash	8.40
Total moisture	0.45
Hydroscopic moisture	0.32
Sulphur	0.032

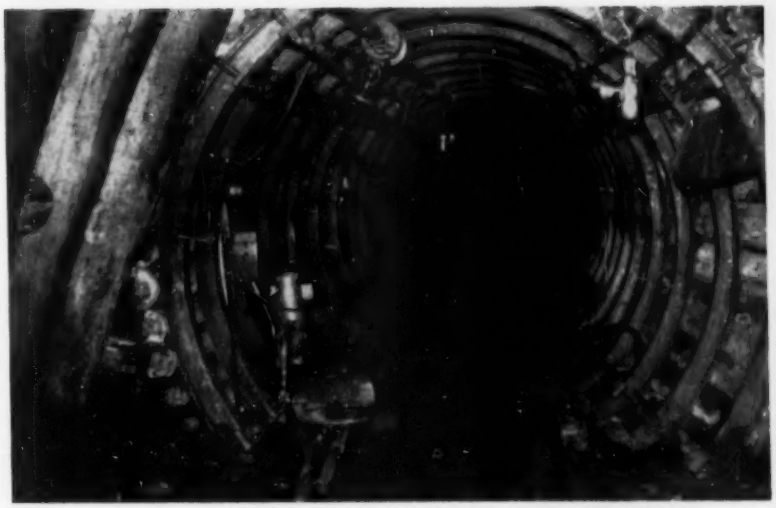
of individual levels is more or less on the dip of the beds.

The run-of-mine ore assaying 50 to 85 percent carbon and containing about 10 percent moisture is trammed by aerial ropeway to the preparation and processing plant which is about 760 feet lower than the mine. The grinding equipment consists of one LÖSCHE mill and a battery of screen-insert type ball mills. A modern drying installation prepares the moist run-of-mine ore for grinding. Preparation and processing is restricted to sorting, drying, and grinding. No attempt is made at carbon concentration by suitable processes.

Packed in paper bags the ground product is conveyed along a 2.5-mile aerial ropeway to the railway siding in the valley below.

Graphite in Lower Austria

The original rocks of this area appear in the form of variegated crystalline schists and slates, the former being of metamorphic, the latter of sedimentary origin (limestone, marl, clays, sandstones). During their period of evolution either group was subjected to strong metamorphic forces and both appear today as metamorphic crystalline schists. Concurrently the entrapped organic matter was transformed into graphite. Due to the high degree of metamorphism, all crystalline schists appear more or less coarse-grained, and the graphite found there show, in places, a distinct macrocrystalline, or flaky, structure, although the larger proportion occurs as the microcrystalline variety.



CIRCULAR STEEL SETS are used on the main haulage levels at the Kaisersberg graphite mine. Note the round pole lagging and electric pump.

The graphite-bearing district covers a strip of land from 10 to 15 miles wide. It enters Austrian territory north of the town Horn, on the Czechoslovakian frontier (the strip continues well into Czechoslovakian territory), and runs in a southerly direction as far as the Danube. From there the strip follows the Danube upstream on either bank to the German border, where it continues into the Passau graphite district. Frequently the graphite-bearing rocks are found in a highly decomposed condition; owing to the weak resistance to atmospherics of the contained pyrites, the sulphuric acid formed in this weathering process worked havoc on the rocks. This entails certain advantages in that mining is facilitated and the grindability of the graphite is improved. However, the high content in sulfides (pyrite, magnetic pyrite) and carbonates is highly undesirable in finding suitable applications for this product. The mineral content consists chiefly of quartz, feldspar, magnetic pyrite, calcite, hornblendites, ferruginous mica, biotite, and clayey components.

In the area between the Danube and the Czechoslovakian frontier a number of small graphite mines, partly by open pitting, had been worked before the outbreak of World War II. Today, there is only one of these mines still being operated in the vicinity of Mühldorf.

Graphitbergbau Mühldorf

The graphite ore is mined underground: the hanging-wall rock of the deposit is gneiss and phyllite, the footwall is partly limestone. The carbon content of the ore runs from 30 to 50 percent. Rock pressure conditions are easier than in the alpine mines. Stoping at the face is done by hand pick and, occasionally, by jackhammer.

Crushed to nut size, the run-of-mine ore is wet-ground in a modified type of pug mill and from there flushed into shallow settling tanks. The settled product is cut into cakes, air-dried, and shipped. Washed graphite of this type contains about 45 to 50 percent carbon and about 6 percent free water. In the washing process, limestone and sulphur are largely eliminated, while the content in other impurities, e.g. mica and clay, remains unchanged. The use of Mühldorf graphites is practically restricted to the manufacture of foundry blackwash.

TYPICAL LANDING AREA near the Glacier Peak property. Below the timber line swaths had to be cut for approaches.

Airlift Is Bear Creek Answer To Short Summer Drill Season

By CHARLES C. GODDARD

On May 20, 1955, Bear Creek Mining Company resumed an exploration program started in 1954 in an area of limited field season and difficult access. Successful completion of the program was facilitated by a helicopter transport.

The Glacier Peak project area is near the crest of the Cascade Mountains of northeastern Snohomish County, Washington. The area is remote, accessible only by 14 miles of mountain pack trail. Heavy snowfall usually limits the field season in this region to about three months.

Trail work, started early in June of 1954, was so difficult and slow that drilling could not be started until the middle of July. The project was recessed because of new snow early in October.

Helicopters or Mules?

During the 1954 season it was found that two strings of mules operating at maximum capacity could haul about 5,250 pounds of freight a week.

More than 40 tons of freight were to be transported to the project in 1955. It would require two mule strings about four months to complete the freighting job. Merely increasing the number of pack strings would not provide the answer to freighting the required equipment. There would still be trail work to contend with and drilling operations would be delayed by piece-meal deliveries. Furthermore, it would have been difficult to find enough animals.

The appealing idea of freighting the equipment by air and dropping it by parachute was considered and discarded as air-drops are difficult in areas of rugged terrain.

Reports of helicopter operations on the Kittimat project in British Columbia suggested that a helicopter airlift to the Glacier Peak project would be feasible. At Kittimat substantial loads had been landed successfully at comparable elevations and in similar terrain by helicopter. In pursuing the subject further, Aero-Copters Incorporated, of Seattle, Washington, were contacted and in January of 1955 a test flight over the airlift route was satisfactorily completed.

Flight Time $100 Per Hour

Original estimates, based on charges quoted by Aero-Copters after the test flight was completed, indicated a freight cost of 21¢ per pound by helicopter as compared to about 11¢ per pound by packing. Far off-setting the higher airlift-cost was the possibility of flying in all equipment weeks before snow conditions would permit use of the trail and in less than half the time required to do the job with several pack strings.

On this particular project the contractor charged a rate of $100 per hour of flight time, excluding federal tax, and $50 per day on standby (non-flight days).

A 19-mile flight route, with emergency landing areas spotted along the course, was selected to provide both maximum, operational safety and economy. The base camp or "heliport" was established in an accessible Forest Service pasture that provided enough room for helicopter operation and storage of equipment.

Mr. Goodard is a geologist for Bear Creek Mining Company, Kennecott Copper Corporation's exploration subsidiary, with headquarters in Spokane, Washington.

A survey of meteorological records on the area indicated good flying weather toward the end of May and the first of June. All equipment was gathered at the heliport prior to the starting date of May 20th and dismantled to parts weighing less than the 400-pound load limit. The helicopter used by the contractor was a 200-horsepower, Bell, Model 47-G, stripped of radio equipment and excess fuel. It was planned to lift a 400-pound payload a maximum of 5,200 feet in the 19-mile course, to an elevation of 6,500 feet above sea level.

Landing Fields

During the first few days of the airlift, personnel commuted to the area and cut approaches through the timber to a landing field where a tent camp was to be established. Two- by four-foot pieces of reject plywood were then hauled for a landing mat and flooring for tents which were set on 12 feet of snow. Above the timberline, landing fields were either flat-bottomed cirques, or notches cut into steep slopes. Fields below the timberline required cutting of swaths through the timber for take-off and approach routes.

The precut plywood, like most of the equipment, was selected for ease in handling and loading on 2- by 8-foot cargo racks built into landing struts on both sides of the helicopter. After a weight check, balanced loads of food supplies, 1,200 gallons of gasoline in 10 gallon cases, 3,200 feet of 10-foot AX rods, 450 feet of casing, tents, a kitchen range, generators, heating stoves and dismantled parts of 3 drill rigs and half a dozen pumps, in order of priority, were lashed to the cargo racks for delivery to the project area.

Delivering Equipment

The largest pieces of equipment included 362-pound, diamond-drill, engine blocks, 50-gallon oil drums, and 20-foot lengths of 4- by 6-inch tripod poles. The heavy engine blocks and oil drums were loaded in slings and suspended from a bomb rack with a release operated by the pilot from inside the bubble. Heavy pieces were more easily flown with the sling type load than in racks as the weight was evenly distributed directly below the machine's center of gravity. In delivery the pilot could hover on target at the drillsite, a few feet above the surface of the snow, and carefully release the heavy cargo. The 20-foot tripod poles were lashed to the cargo racks and handled in the same manner as drill rods or casing.

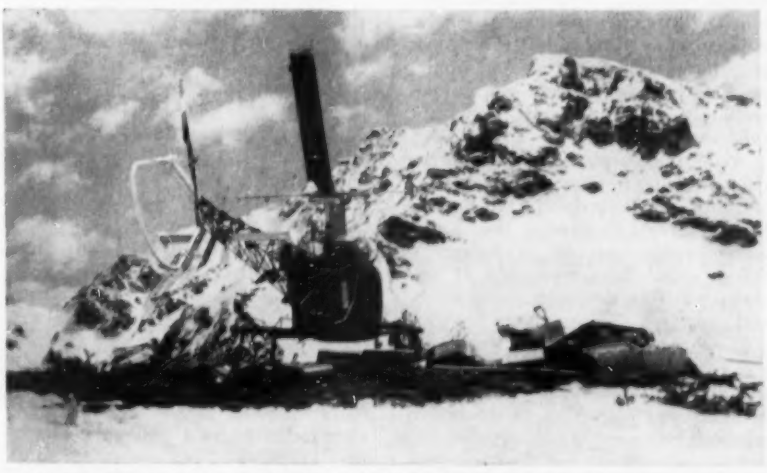
The Bell helicopter was more than adequate for the job of freighting exploration equipment. Loads weighing over 400 pounds were flown to elevations of from 5,500 to 6,500 feet above sea level.

About 49 tons of equipment were flown into the project area in approximately 170 hours of flight time at a cost of 19 cents per pound. On the downhill haul, which excluded plywood, gasoline, and expendable items, about 17 tons were ferried out of the area in a little over 47 hours of flight time at a cost of 15¢ per pound.

Although 14 flight days were lost, due to inclement weather while moving in to the project, two drill rigs were operating by the end of June and the drilling program was completed in September.

Performance and Cost of Helicopter Transport

Type of helicopter:	**Bell 47-G, Franklin engine (200 horsepower)**
Contract price:	**$100 per hour of flying time, $50 per day of standby time, plus Federal tax of 3 per cent on freight and 10 per cent on passengers.**
Average length of haul:	**19 miles.**
Altitude of staging area:	**1,300 feet.**
Altitude of unloading areas:	**5,400 to 6,500 feet. Average 5,800 feet.**
Maximum load:	**412 pounds.**
Maximum haul per day:	**5,250 pounds.**
In haul:	**Flying time—169 hours, 57 minutes Standby time—17 days. Pounds hauled—97,332. Total Cost—$18,606.09. Cost per pound—19.1 cents.**
Out haul:	**Flying time: 47 hours, 15 minutes. Standby time: 2 days. Pounds hauled: 33,803. Total cost: $5,021.44. Cost per pounds: 14.9 cents.**



SNOW DEPTH at this point is about 10 feet. This is why helicopters were used to set up and supply a summer diamond drill program by Bear Creek Mining Company in a remote section of the Cascade Mountains in Washington.

URANIUM ORE PRODUCERS elected a new board of directors at the annual meeting in Grand Junction, Colorado in mid-May. Directors are elected on a geographical basis. Those present at the meeting and the area they will represent this year include: Left to right front row: Allie Rinderle, Gateway, Colorado; Clyde Boyle, South Dakota; H. D. Hand, Wyoming; Walter Bronson, Monticello, Utah; Belmont Richards, Green River, Utah; Ray Bennett, Colorado Western Slope; and Norman Ebbley, Grand Junction, Colorado. Middle row: Jake Lewis, Gateway, Colorado; Carl Olson, North Dakota; Howard Balsley, Moab, Utah; Walter Gramlich, Moab, Utah; and Phillip Peters, Wyoming. Back row: Dwight Oliver, Norwood, Colorado; John Schumacher, Grand Junction, Colorado; Bob Williams, Norwood, Colorado; Irving Rapaport, New Mexico; Tom Bolack, New Mexico; and M. C. McGrath, Grand Junction, Colorado. Norman Ebbley succeeded Tom Skidmore as Association president.

Uranium Institute Announces Public Relations Plans at UOPA Uranirama

Uranium mining men from all parts of the United States gathered in Grand Junction, Colorado in mid-May where they saw and heard definite evidence that their industry has now progressed out of the hectic, "infant" stage to become a firmly established, well-organized, and very important business.

And while they attended the three-day sessions of the Third Annual Uranium Ore Producers Machinery Exposition and Uranirama, they heard an inspiring report on the industry's future possibilities from one of the nation's leading economical and financial experts.

Receiving considerable attention at the Uranirama were the meetings of the newly formed Uranium Institute of America. Set up to foster better relations between the industry and the public, as well as for research and other purposes, the Institute started out by naming a 25-man executive committee with Admiral R. W. D. Woods, president of the Minerals Corporation of America, as chairman.

Hardy Burt, nationally known news analyst, was main speaker at the Institute's first session, and told the group "you have to fight fire with fire." Referring to a recent series of national magazine articles severely criticizing the uranium industry, he said, "You can't just deny statements and leave it at that. You must attack back with as much vigor as they attack you."

During the Exposition, Mr. Burt made two national broadcasts concerning the uranium industry, and interviewed several of the delegates at the sessions.

Equipment exhibits, a parade, a beauty queen contest, banquets, and other features of the annual event were forgotten for a while when Newton I. Steers, Jr., president and founder of the Atomic Development Mutual Fund, Inc. of Washington, D. C. told the delegates of his feelings as to the future of the industry.

Mr. Steers—president of a firm which has some $46,000,000 at its disposal for investment in uranium and atomic energy—said, "Our organization is confident that the uranium industry will still be flourishing 10, 20, and even 30 years from now." He said he feels certain the government will continue to support the uranium industry following the expiration of the present ore-procurement program in 1962. "However," he said, "we feel that even if the government does not support the industry, the rising demand for uranium from private industry and for military propulsion will far surpass the supply—not just the United States' supply, but that of the entire free world." He pointed out that the United States program of development of atom-powered vehicles for military purposes is well advanced. Fifteen atomic submarines, such as the famous *Nautilus*, are in various stages of con-

struction or planning, he said, and the target date for completion of the first atomic-powered airplane is only two years away. "It does not seem the least unlikely," he said, "that by 1965, our nation will have developed enough atomic-powered vehicles to use a tremendous percentage of the free world's uranium production."

In addition to propulsion uses, he pointed out that development of atomically produced electricity by 1965 will be such that the cost of production of one kilowatt hour of electric power will be down to only 0.6 cents. Production of atomic weapons, and other developments in atomic energy will also use considerable tonnages of concentrates, creating a demand for uranium larger than is presently imagined by most men in the industry, he said.

"With or without government support," he told the delegates, "you men on the Colorado Plateau will have to fill a larger and larger pipeline as the uses of atomic energy increase."

He said that because of the growing demand for uranium, the post-1962 ore-buying program of the government might even pay a higher price than at present to the producer for his ore.

Throughout the three-day program, it was evident that the industry has become greatly stabilized since last year's convention and machinery exposition. Allen E. Jones, manager of the Grand Junction Operations Office of the United States Atomic Energy Commission, said, during his keynote speech at the annual banquet, "I can easily see that this group is considerably smaller than last year, but I am quite certain quality is replacing quantity."

Mr. Jones went on to tell the group that the Commission is presently studying 10 official proposals for contracts for new uranium processing mills. In addition, two more proposals ask for expansion of existing mills. Another dozen or so firms have also expressed interest in constructing mills, but have not submitted official contract proposals, he said.

E. J. Mayhew, general manager of Apex Exploration Company of Moab, Utah, gave the delegates a statistical picture of the change in industry activity between 1955 and 1856. In a survey conducted by his firm, he said, it was found that more than half of the firms active in the Moab area in 1955 are not in existence today. Over half of the non-existent firms went broke, he said, others merged, and still others sold all assets. The number of new firms to form in 1956 will be less than half of that last year, he predicted.

According to the survey, exploration drilling in the Moab area in 1956 will be 75 percent less than last year, while development drilling and drifting will be up. He predicted that the peak production period from mining districts around Moab will come late in 1956, or very early next year. "Chaos is no longer normal," he said. "Moab and the surrounding region is back to the steady grind of planned exploration and mining."

URANIUM INSTITUTE OF AMERICA gets underway on its program for a strong public relations program. Left to right at the Institute's first meeting are: Max Hage, Institute executive director; Neilsen B. O'Rear, public information officer for the AEC; Col. T. R. Gillenwaters, president of Uranium Engineering Company and moderator at the session; Admiral R. W. D. Woods, first president of the Institute; Hardy Burt, nationally-known news analyst, and William Gray, executive committee member and official of the Southwest Research Institute of San Antonio, Texas.

Linka Mill

Continued from page 55 (WM49)

so that it can be effectively tabled. The pulp is then fed to a Deister table which splits the concentrate into its low-grade and high-grade fractions. Approximately 50 percent of the tungsten reports to either product. The high-grade concentrate is dried on heated plates, sacked, and shipped. At present the low grade is thickened periodically in a Dorr 16-foot-diameter unit and filtered on a Denver four-disc filter. This fraction is sold to the Salt Lake Tungsten Company's synthetic scheelite refinery for further treatment.

Acid Treatment

The company is building an acid treatment plant to up-grade flotation concentrate to 60 percent WO_3, or higher. The plant is partially complete, all the equipment is at the site, and completion is expected shortly. The plant flowsheet incorporates an HCl leach in a series of agitators to eliminate the lime and phosphorus content of the Linka concentrate. The leach liquor will be decanted off to a settling sump to recover any solids carried over. The leached residue in the agitators (clean tungsten concentrate) would then be dried in a filter press and bagged for shipment.

The remarkable recovery of tungsten, obtained by tabling the flotation concentrate, in specification grade form has made the execution of plans for the acid treatment section problematical. There is some question whether further treatment facilities are necessary or would be paid off by the greater amount of clean tungsten concentrate. The foundation for the acid treatment section, adjoining the mill, is being completed and will be roofed over. Equipment installation will await further developments now taking place at the Linka mine, and other properties held by Consolidated Uranium.

Power is furnished by three General Motors twin Diesel generators, one of which is a standby unit. The second drives units in the ball mill classifier circuit. The third supplies electricity for the flotation cells, pumps, and other machinery in the mill. Each twin Diesel generator set is rated at 210 kva, and they are interconnected through a stack pyrometer for complete synchronization. Thus, each engine will pull an even load. A Caterpillar D 13000 serves as an auxiliary power source for the crushing circuit.

Lawrence Smith is mill superintendent and S. S. (Sam) Mele of the Booth Company, Inc. acts as consultant for mill operations.

What's The New Look At Bunker Hill?

. . . with John D. Bradley, President Bunker Hill Mining Company

Q. What does the new name mean to the company's operations?
A. The historic name of Bunker Hill and Sullivan Mining and Concentrating Company has been outgrown. Bunker Hill's activities are expanding; it is becoming a better integrated industrial unit. Besides "mining and concentrating," Bunker Hill sells sulfuric acid, and fabricates and sells metal products in addition to processing and custom-smelting concentrates from Canada, Australia, South America, and from other United States mines.

Q. In 1955 the greatest tonnage of ore was mined in a single year. Is the mine development being expanded as tonnage is raised?
A. Development work is being maintained at a rate adequate to more than support the normal level of ore reserves.

Q. What is the policy for outside exploration?
A. We are naturally concentrating on lead and zinc. If, in our search, we run into something attractive for any other metal, we'll give it every consideration, but our aim is to fill our own pipelines as well as possible because we are furnishing only about 50 percent of our own ores to our reduction plants.

As to areas for further exploration outside of the Coeur d'Alene district, we look at the northwest, including Canada and Alaska, as a very favorable area owing to its great mineral resources, productivity and geographical proximity to Bunker Hill. We plan to focus most of our exploration energies in this area, but we are not going to overlook possibilities in other areas—whether in South America or elsewhere—that can be considered tributary to our reduction plants.

Q. What outside property was taken under option in 1955?
A. That was the J. G. property on the east side of Duncan Lake about 30 miles north of Kaslo, British Columbia, where we have 53 lead-zinc claims. More recently, properties in the Bayhorse district near Challis, Idaho, have been optioned. Work at both properties will be undertaken this summer.

Q. What plant improvements is the company making?
A. We are planning a 50 percent increase in capacity at the electrolytic zinc plant in two stages of 25 percent each. Work is progressing well and we hope to have the first stage completed by the summer of 1957. At the lead smelter, plans include remodeling of the refinery and also modernizing the roasting facilities.

Q. Will it be necessary to purchase more zinc concentrates? If so, what will be the source?
A. To match the increased zinc plant capacity, we'll have to purchase more zinc concentrates outside of the Coeur d'Alene district. We are hopeful that the Pend Oreille Mines and Metals Company's operations will expand over the next few years but, of course, did not count on this in making our decision to enlarge the zinc plant capacity. In addition to available supply sources from Canada and overseas, the zinc fume produced at the lead smelter would be equivalent to about one 25 percent zinc plant expansion step—it is possible that we may decide to utilize this source. One compelling reason for the decision to expand the zinc plant was that its capacity has been out of step with that of the lead smelter, since the lead smelter now has a monthly capacity of 10,000 tons of lead, whereas, the zinc plant's current capacity is only 4,800 tons of zinc. When you compare this relationship with the nature of the ores in the area—where there may be a 3-to-1 zinc-to-lead ratio—you can see that in order to gain and hold the lead supply we must be able to receive more zinc. In addition, of course, the growing demand for Bunker Hill special high grade zinc assures us of an expanding market for this product.

Q. What plans are being made to expand sulfuric acid sales so that the plant can be operated at capacity?
A. We anticipate a program with fertilizer producers for long-term contracts to take care of important tonnages of acid. We can also visualize, and rather concretely see, new market possibilities outside of the fertilizer field. I think that in just the two years of operation of the acid plant a good selling job has been done, since sales have jumped from 10,000 to 50,000 tons a year.

Q. What about getting into the fertilizer business to use your own acid?
A. We are continuing to study this—it seems very probable that sometime in the future Bunker Hill will enter the fertilizer business.

Q. What are possibilities of resuming block caving operations?
A. In the upper levels all mining equipment connected with the old block caving operation has been removed. We are, however, starting at a lower point in a zinc area in the mine where we plan to try different mining systems—perhaps not actual block caving, but some other form of mining cheaper than our normal square set stoping. We are, of course, also experimenting in some of our stopes in the lower country that would normally be square set. There we are trying to develop different mining methods that will reduce timber requirements.

The annual report of The Bunker Hill Company for 1955 shows a significant number of record-breaking statistics . . . the greatest number of tons of ore mined in a single year; the largest quantity of lead ever produced and sold in a year; the greatest amount of zinc ever produced and sold in a single year; the greatest tonnage of sulfuric acid produced and sold in a year; the largest sales by the fabricating subsidiary, Northwest Lead Company, in a single year; and the largest net working capital position in the history of the company.

To get the human side of these records, MINING WORLD interviewed president Bradley. His energetic approach to his company was exemplified when at the close of the interview he said, "All these accomplishments are gratifying, but we do not intend to rest on our oars; Bunker Hill must continue to advance and expand."

Mr. Bradley, the son of a famous mining engineer, has been in the mining business all his life. As executive vice president of the Bradley Mining Company, he directed tungsten and antimony mining activities in Idaho for many years. For several years a director of Bunker Hill, he became executive vice president in 1954 and president in 1955. Long an aviation enthusiast, he flies his own plane to speed Bunker Hill business.

JOHN D. BRADLEY

Q. What steps are being made for more aggressive sales?

A. We have announced the liquidation of Northwest Lead Company and that should be effective, hopefully, by mid-year. Then the Sales and Fabrication Division will replace that organization and also the Bunker Hill smelter sales activities, and we will be headed towards having a more effective selling team.

Q. What about the education program you have started in order to make employees cost-and-profit conscious?

A. Well, we're attempting to do that through several means: one, by newsletters to the employees periodically to keep them abreast of goals, policies, and activities; another, by group meetings of all salaried employees to make everyone conscious of the company rather than of his own department. In addition, management and operating committees have been established to meet at regular intervals to review problems and policies, and to exchange information from one department to another. The operating committee is comprised of that personnel which backs up top management. There had been a tendency, as is very commonly the case, for the different major departments to be chiefly concerned with their own particular field of endeavor and to tend to overlook the overall company concept. Now we have reorganized the Kellogg structure so that, for example, all of the main service departments are in one division: construction, transportation, warehousing, purchasing, and engineering. All are centrally located and set up to serve the entire Kellogg operations. This includes the electrolytic zinc plant which until last October was under the Sullivan Mining Company and had its own separate service type organizations. Related activities have been grouped together and responsibilities have been more clearly defined.

A Management Guide has been developed which is quite broadly distributed throughout the operating personnel with the following aims:

1. To communicate objectives, policy and organizational information.
2. To act as a guide for controlling the sound development of company structure.
3. To prescribe the method for formulating and revising company objectives and policies.

This Management Guide is constantly kept up-to-date as any policies, objectives, or organizational changes are made.

A salary administration plan was placed into effect in the fall of 1955 covering all salaried personnel. This plan involved a great deal of education and planning including job analysis, job measurement, job grading, job pricing, and the development of salary administration policies and procedures—all of this proved most helpful in pinpointing areas of responsibilities and where and how each individual can be most effective.

In addition, an Executive Compensation Plan for the group of top managers became effective on January 1, 1956 and a somewhat similar but broader plan may be instituted during the current year.

Management reports are being restructured with the aim towards gaining an integrated set of reports—easy to understand, interpret and use—so that the managers will be better able "to keep a finger on the pulse" of the operations for which they are responsible. A corollary objective is to help managers and supervisors understand and learn how to use effectively the reports developed. The hoped for benefits of this latter program have yet to be seen.

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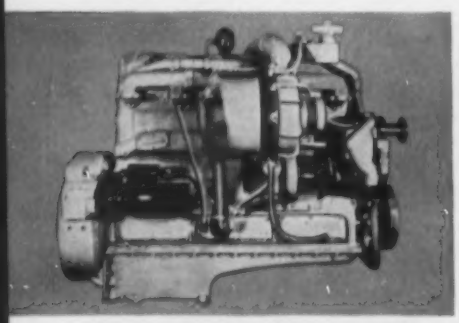
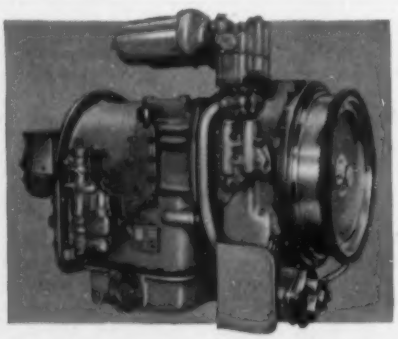
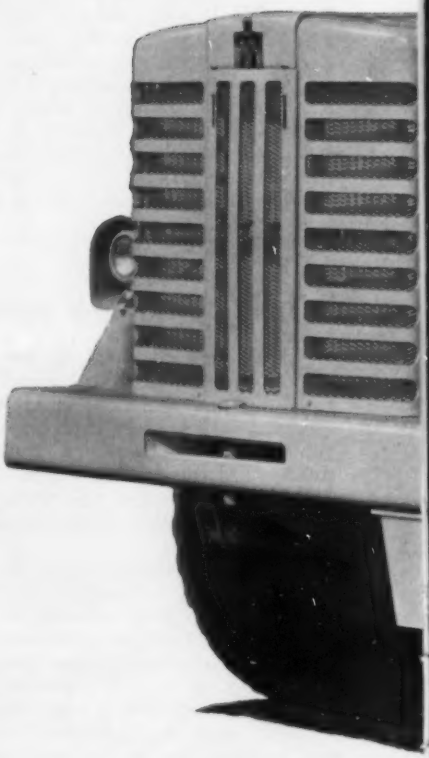
Hundreds of contractors, mine owners, quarry operators, and other equipment users told our engineers what they needed in an off-highway hauler. Their suggested design features have been carefully built into the new International Payhaulers. In these rugged, all-new, rear-dump haulers, you have greater horsepower-to-payload weight ratios than are available in most other off-highway trucks. You have stronger main frames to carry bigger payloads with rugged dependability. You have higher hauling speeds . . . full-power hoists for faster dumping . . . better all-around visibility.

These features are the result of rigorous, field testing. Payhaulers have worked on many contracting, mine, quarry, and similar jobs. Others have run "round-the-clock" at our proving grounds. Others have undergone painstaking laboratory research. Now all this testing is completed and the Payhaulers are ready to roll. You owe it to yourself to check their features. Our test users did—and, as proof of outstanding Payhauler performance, a great many have placed their orders. Compare Payhaulers with your present hauling units to see what profit-making features you will get.



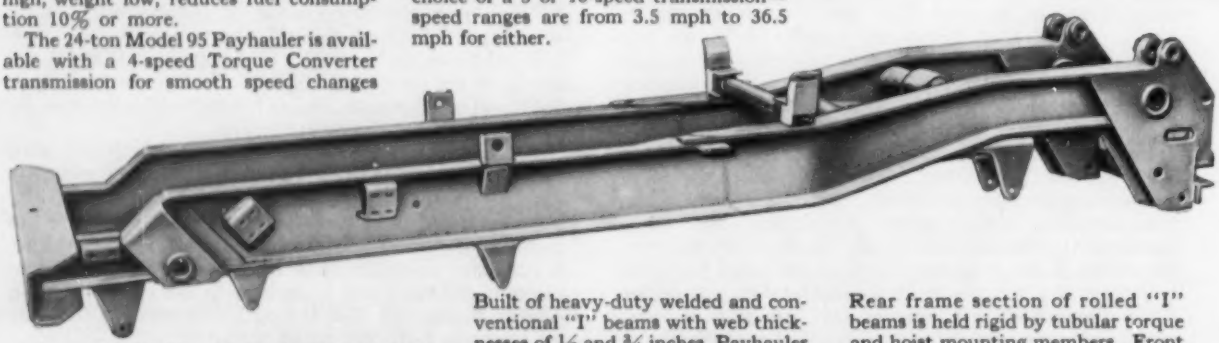




TURBO-CHARGED DIESEL ENGINES—CHOICE OF TRANSMISSIONS—Both the "65" and "95" Payhaulers have more horsepower per truck yard than any other truck in their size classes. The 24-ton, 16-yard "95" is powered by a 335 hp diesel...the 18-ton, 12-yard "65" is powered by 250 hp. Turbo-charging keeps power high, weight low, reduces fuel consumption 10% or more.

The 24-ton Model 95 Payhauler is available with a 4-speed Torque Converter transmission for smooth speed changes from 4.8 to 38 mph. A lock-up clutch for direct drive performance and a Torqmatic brake system are standard with the Torqmatic transmission. Also available for the "95" Payhauler is a 9-speed transmission which provides an excellent range of speeds from 2.6 to 37.2.

In the Model 65 Payhauler you have a choice of a 5 or 10-speed transmission—speed ranges are from 3.5 mph to 36.5 mph for either.



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Built of heavy-duty welded and conventional "I" beams with web thicknesses of ½ and ¾ inches, Payhauler main frames have the strongest known section modulus of *any* off-highway truck.

Rear frame section of rolled "I" beams is held rigid by tubular torque and hoist mounting members. Front frame members flex with shock loads through channel bumper torque member.

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- Power Shift Transmission

ALL WELDED ROCK-RUGGED BODIES—The Model 95 Payhauler shown is equipped with heated body. Quarry bodies available for both the Model 65 and 95 Payhaulers.

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Muriel Sibell Wolle Describes

OATMAN: ARIZONA'S 20TH CENTURY GOLD CAMP

Oatman, Arizona was a quiet town in 1951 with only 111 voters. The new highway between Kingman and Davis Dam, Nevada, had made it almost a forgotten town and a completely unknown one to the thousands of tourists who skim over the new pavement. But the former 28-mile approach to Oatman over Sitgreaves Pass from Kingman was both scenic and dramatic, for the road looped around the shoulders of bare, rocky mountains, whose sides were dust-dry and cactus-studded. Three miles before reaching Oatman, the highway swung through deserted Gold Road, and then suddenly dipped into the rock-rimmed basin where Oatman lies, backed by the Black Range.

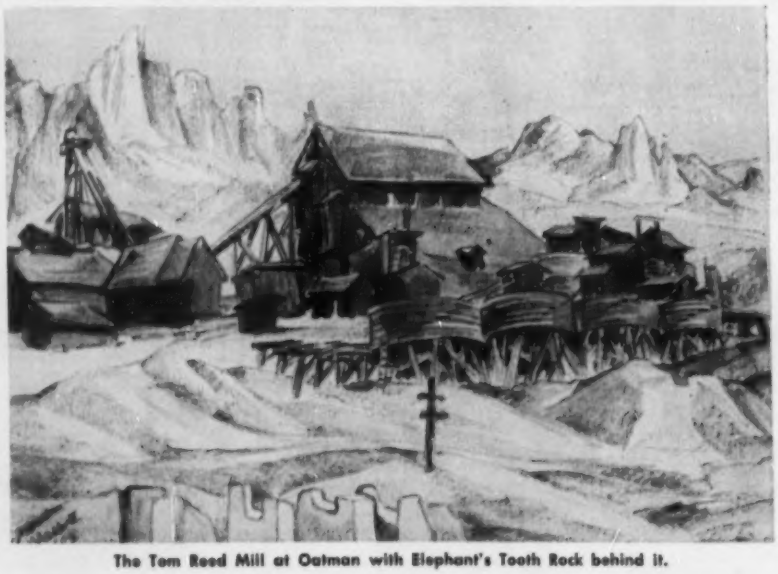
A huge, taffy-colored tailing pond sprawls beside the highway, shafthouses and gallows frames straddle the tops of dumps, and rows of houses, half hidden by flowers and scantily shaded by scraggly palm trees, perch on several levels of mountain. In the distance the sharp silhouette of Boundary Cone rises above the surrounding barren peaks.

The discovery of gold in the area was made in 1863 by John Moss, who uncovered a stringer of high-grade ore in a 10-foot hole, and from two tons of the ore netted $114,000. When this rich pocket was worked out the property was abandoned. During the next 30 years other prospectors combed the area and located a few claims, but nothing worthwhile was uncovered until 1900, when the Blue Ridge mine, later known as the Tom Reed, was found in Blue Ridge Wash, near the base of the central part of the Black Range. The property passed through many hands before paying dividends even through a sheriff's sale. About 1901 the Gold Road Company sunk two shafts—the Ben Harrison and the Tom Reed, each to a depth of 100 feet. In 1904, the Blue Ridge Gold Mines Company acquired the property and installed a mill. An average of 30 tons of $7 ore a day was milled, but since considerable gold was left in the tailing, a noticeable percentage of the total was lost.

The Tom Reed Gold Mines Company, with headquarters at Pasadena, California, became owner in 1906. Its holdings covered 11 claims "adjoining one another end to end and extending along the vein a distance of about three miles." Production at that date is said to have exceeded $120,000. By 1908, the mine with further development, was one of the biggest producers of the county and the mill regularly produced gold bricks. By 1912 the ordinary monthly cleanup of the mill was valued at $70,000. On Nov. 9, 1912, the *Mohave County Miner* reported: "About the largest shipment of gold bullion ever received at Kingman at one time, arrived under special guard from the Tom Reed, —five yellow bars with a total value of $133,000—one month's run at the mill." The bullion was shipped to San Francisco.

Next engineers and geologists inspected the district, but they pessimistically announced that with the exception of the Tom Reed and Gold Road properties, there were few promising prospects to be found. In spite of these reports, a "practical miner," George W. Long, who had worked in the Tom Reed in 1914, was convinced that rich ore lay in a "branch vein northward and away from the general trends in which the Tom Reed was confining its efforts." Supported by a few interested friends, he formed the United Eastern Mining Company; acquired three claims adjoining the Tom Reed on the north and began exploratory work. "Within 300 feet of the surface the major vein was cut." At greater depth an ore body, estimated at 500,000 tons, with an average value of $20.00 a ton, "and containing stringers running as high as $2,100 a ton," was opened.

This discovery, made in February 1915, started the rush to the district. Claims were staked all over the area; mining companies mushroomed overnight and everyone was certain that quantities of rich ore lay deep under the surface waiting to be released. The Big Jim Mining Company after six months of work uncovered a 48-foot ledge on the 400-foot level. H. E. and F. M. Woods examined several older properties including the Lexington group, 1½ miles west of the Tom Reed. They also formed a company to develop the Nil Desperandum group, three Golconda claims and the Dawson City. The Boundary Cone Mines Company, the Gold Dust Mines Company, the Gold Key Mines Company, the Black Range



The Tom Reed Mill at Oatman with Elephant's Tooth Rock behind it.

Mines Company, the Carter Gold Company were only a few of the 110 companies holding properties in the district, whose "105 new headframes and hoisting plants" had suddenly appeared. By 1916, the Tom Reed shaft was 1,225 feet deep.

All during 1916 extravagant accounts of Oatman's progress appeared in the *Mohave County Miner* and in the *Mining and Engineering World*. According to these publications:

"From a one-mine, slowgoing camp of a few hundred souls to a district having three proven properties and some 100 companies doing active development work, . . . where 12 months ago there was a sleepy little village supported almost entirely by the Tom Reed Mining Company, which employed 200 miners, and a few hardy prospectors, scattered through the hills, today there is a booming town of 3,500 . . . growing by leaps and bounds and with an estimated population of 5,000 within the district."

Oatman itself is named for a spring in the immediate vicinity—called the Ollie Oatman spring in memory of a white girl captured by Indians in 1851 and hidden near it while friends searched for her.

Royce and Mary Oatman, with their seven children, left Independence, Missouri in late fall 1850 for California, as part of a train of nine wagons. By February 1851, the group of 50 people had gotten only as far as Tucson, Arizona. The whole party was in poor shape and did not dare face the hundreds of miles of desert ahead without resting their cattle and replenishing their supplies.

Oatman was afraid to delay longer for fear his oxen would give out entirely. Before setting out, a Dr. John LeCount and his Mexican guide arrived on horseback from Fort Yuma on the Colorado River (having just crossed the 200-mile stretch of desert that lay ahead) and reported that he had seen no Apaches. LeCount also told the Oatmans that he was returning to Fort Yuma in a few days and would overtake their wagon on the way.

Two nights later LeCount and the Mexican were surrounded by Apaches who did them no harm but stole their horses. The following morning LeCount sent the Mexican ahead for help. After making a sign and hanging it on a tree, warning the Oatmans to watch out for Apaches, LeCount started on foot for Yuma.

Whether Oatman saw LeCount's warning sign is not known. Perhaps he concealed it from his family, realizing there was nothing to do but go on. At any rate, while making camp for the night, a band of Apaches rode up and asked for food. Oatman gave them a little flour and told them that was all the food he had. They demanded more and when refused they rode off a short way. Suddenly, they dashed back to the helpless family and quickly killed six of the nine. Lorenzo, who was 16, was knocked unconscious and left for dead; Olive, who was about 14 and Mary Ann, 7, were carried away by the Apaches. Next day Lorenzo painfully staggered back toward the Pima villages and was soon reunited with the Wilders and Kellys, who took him with them to California. No trace of the girls was found.

Some time after her capture Olive was traded to Mohave Indians by the Apaches and was with them when found five years later. Mary Ann died in captivity. The girls were said to have been hidden by the spring (near Oatman) while unsuccessful search was being made for them. Olive and her brother, who had been living in Los Angeles, were reunited in 1856.

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Get the full story on the FORTY FIVE—check its extra-big clearances, exclusive ROLL-AWAY moldboard, single-member tubular frame, fully enclosed power steering, long-wearing double-disc clutch and unit construction.

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SLOPING. The FORTY FIVE has a blade position for every job. It's just a matter of seconds to change from bank cutting to ditching to grading. Complete power control through toggle-type levers gives operator finger-tip command with positive "feel" of the blade at all times. Note high axle and throat clearance.

ROLLS BIG LOADS. Oberg Bros. of Inglewood, California, put their FORTY FIVE to work rough grading on the Ventura Freeway in the San Fernando valley. ROLL-AWAY moldboard handles bigger loads . . . rolls the earth instead of pushing it, reduces friction drag, makes more economical use of engine power . . . moves more dirt with less effort.

GRADING STREETS. W. A. Strange of La Mesa, California, uses his FORTY FIVE to build streets and sidewalks at a housing project. 120-brake horsepower Allis-Chalmers diesel engine provides real lugging power . . . responds quickly to varying load conditions. Accelerator-decelerator on platform throttle pedal allows operator to change grader's speed without touching hand throttle setting.

FINISHING BETWEEN FORMS. It takes a steady blade to peel off the last inch of tough earth. The FORTY FIVE's lift cases are located directly over the circle . . . design that means less blade vibration . . . assures smooth, precision cuts.

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United States

Personalities in the News

WILLIAM BELLANO has been appointed to the newly created post of director of mining and minerals exploration, International Minerals & Chemical Corporation. Mr. Bellano was formerly production manager of International's Phosphate Chemicals Division, where his principal responsibility was management of the Bonnie phosphate chemicals plant at Bartow, Florida. The creation of the new position emphasizes the company's plans for exploration and development of new ore deposits, and the development of newer, low-cost mining methods. Mr. Bellano's new headquarters are in Chicago.

Alfred R. Flinn was recently promoted to eastern manager of mines for the New Jersey Zinc Company, with headquarters in New York. Associated with the company for over 40 years, Mr. Flinn now has general supervision of the mines east of the Mississippi River. **A. L. Hayes** is the new assistant to the vice president in charge of mining and exploration. He has been with New Jersey Zinc since 1927.

John A. Johnson, formerly district health and safety supervisor of the U. S. Bureau of Mines, Duluth, Minnesota, has moved up to the position of Bureau safety division chief in Washington, D. C. He has been replaced in Duluth by **Allen D. Look.**

Brower Dellinger has been named manager of the Monticello uranium mill, operated for the U. S. Atomic Energy Commission by National Lead Company. Until recently, Monticello was run by Galigher Company. Mr. Dellinger was previously superintendent of exploration for National Lead's Colorado Plateau uranium operations.

Dr. George A. Kiersch is serving as director of the Mineral Resources Survey of the Navajo country, Arizona-Utah, which is investigating the mineral resources of 11,000,000 acres of Indian lands. Dr. Kiersch resigned as associate professor, University of Arizona geology department, to devote his time to this survey.

Horace Y. Bassett was elected executive vice president of Calumet & Hecla, Inc. recently. Since 1953 he has been vice president of operations. He will remain at the Chicago headquarters of the company.

Clifford W. Niemi succeeds **Gordon R. Wynne** as superintendent of U. S. Steel Corporation, Oliver Iron Mining Division's Extaca taconite agglomeration plant at Virginia, Minnesota. Mr. Wynne has been transferred to the district industrial engineering department.

Martin J. Hughes was recently appointed mine manager of the iron ore mining operations of Kaiser Steel Corporation at Eagle Mountain, Riverside County, California. Mr. Hughes will have charge of the annual production of over 2,000,000 tons of iron ore and the operation of the beneficiation plant which upgrades the iron ore for the steel plant in Fontana. He succeeds **James G. Hansen** who will supervise the opening of the Cushenbury limestone deposits, Lucerne Valley, for Permanente Cement Company, another Kaiser-managed company.

Dr. Kenneth L. Cook, professor and head of the Department of Geophysics, University of Utah, has been appointed chairman of the Mining, Geology, and Geophysics Division and director ex officio of the AIME.

R. T. Whitzel has been named general production manager of Aluminum Company of America, Pittsburgh, Pennsylvania. His previous position as general manager of the smelting division is being filled by **John D. Harper**, former assistant manager. In his new job, Mr. Whitzel will be responsible for all metal production and fabricating operations of the company.

Henry S. Curtis was recently named manager of the American Potash & Chemical Corporation plant at Henderson, Nevada. Mr. Curtis formerly was with Monsanto Chemical Company in Texas City, Texas.

J. Louis Reynolds has been elected executive vice president by the directors of the Reynolds Metals Company. He succeeds **Marion M. Caskie**, who retired recently.

Philip I. Conley of Wallace, Idaho, has taken the post of chief geologist at American Smelting and Refining company's northwestern mining department to succeed **A. O. Hall**, who resigned. Mr. Conley has been with ASARCO since 1946.

Richard Knight, Provo, Utah, mining engineer, has been named vice president and director of five mining firms controlled by International Smelting & Refining Company (Anaconda Company).

J. Bruce Clemmer of Salt Lake City, chief of the division of mineral technology of the U.S. Bureau of Mines, recently received the Department of Interiors' highest honor, the Distinguished Service Award, for "outstanding contributions to conservation and national security through advancement of the science of mineral technology."

ROBERT M. HARDY (left) has turned over his post as president of Sunshine Mining Company, Yakima, Washington to his son ROBERT M. HARDY, Jr. (right). The elder Mr. Hardy, who has been president for many years, will now take over chairmanship of the finance committee. Mr. Hardy, Jr. was formerly executive vice president and manager of the company's exploration and petroleum divisions. Company elections also resulted in a new director, JOEL E. FERRIS, replacing R. D. LIESK. FRANK M. HARDY was elected secretary-treasurer.

PAUL GEMMILL has been named general manager of Utah and Nevada operations of Combined Metals Reduction Company. Before his new appointment, Mr. Gemmill was plant manager at Pioche, Nevada for the company, and previous to that was general superintendent of mines for Nevada CMR. In 1945, Mr. Gemmill served as chairman of the Nevada section, American Institute of Mining and Metallurgical Engineers.

Felix E. Wormser, Assistant Secretary of the Interior, was named 1956 recipient of the Egleston Medal, Columbia University's highest award for "distinguished engineering achievement." Mr. Wormser received the award recently at a dinner in his honor at the Waldorf-Astoria Hotel.

D. F. Coolbaugh has been appointed consulting mining engineer for United Mining & Leasing Corporation of Central City, Colorado. Mr. Coolbaugh holds degrees of both Engineer of Mines and Geological Engineer from the Colorado School of Mines. For the past ten years, he has been engaged in the mining industry in the Western States, Mexico and Honduras.

Charles T. Zaoral and **Lee B. Morey** were elected directors of the Vanadium Corporation of America. Mr. Zaoral is president, director, and a member of the executive committee of New York Air Brake Company. Mr. Morey is a member of the law firm of Chadbourne, Parke, Whiteside & Wolff.

Edward R. Borcherdt has been named to the newly created post of director of mining research for the Anaconda Company. Mr. Borcherdt has been chief research engineer for the company since 1938. **Francis L. Holderreed** is now director of metallurgical research. He has been research engineer at the Anaconda Reduction Works since last August.

M. C. Irani, former member of the Research Foundation of Colorado School of Mines, has been appointed vice president of research and development of the Metals Chloride Division of Salem-Brosius, Inc., Pittsburgh, Pennsylvania. His work will deal with the development of applications for the division's new high temperature chlorinating furnaces and product development through the use of the equipment.

Kenneth D. Lair, Ray Mines Division of Kennecott Copper Corporation, has been chosen as development engineer. Mr. Lair has been with the division since June of 1953. **Rene F. Kast**, former development engineer, is now employed with the exploratory drilling

Continued on page 98

Newsmakers in International Mining

LAWRENCE LITCHFIELD, Jr., Aluminum Company of America's mining division general manager, has been elected a vice president of the company. Mr. Litchfield joined Alcoa in 1925 with engineering duties in Europe and Africa; in 1926, he became acting managing director of an Alcoa subsidiary in Surinam, South America. After several positions with the company's bauxite mining operations, he was named president of Alcoa Mining Company in 1952. That company later became Alcoa's mining division and he was made general manager.

Harry MacConachie, consulting mining engineer for the Anglo American Corporation of South Africa Limited, has returned to his Johannesburg headquarters following an inspection trip of mines in the United States. Among mines visited by Mr. MacConachie were Homestake Mining Company, Lead, South Dakota; San Manuel Copper Company, San Manuel, Arizona; Magma Copper Company, Superior, Arizona; the Anaconda Company's Butte, Montana operations; and the Utah Mines Division of Kennecott Copper Corporation at Bingham Canyon, Utah.

T. M. Andersson has resigned from his position as assistant mill superintendent with the Neptune Gold Mining Company, Bonanza, Nicaragua. In partnership with **E. M. Scanland,** he has taken over the Santa Rosa mine, a small gold property on the Rio Huaspuc.

G. Rosello and **J. Lormond,** of the Bureau Miniere de la France, Noumea, New Caledonia, have been in Australia for several weeks inspecting methods used by the Commonwealth Bureau of Mineral Resources for geophysical and geochemical surveys of metalliferous deposits.

L. J. Parkinson, head of the Mining Engineering Department at Colorado School of Mines, Golden, Colorado, will be visiting lecturer at the University of Bologna, Italy's major mining school, during the first semester of the 1956-57 college year. The Denver Il Circolo Italiano has arranged this as part of an exchange program. **Dr. Aves Badini,** Italian petroleum engineer, is attending the Colorado School of Mines graduate school under the program.

F. J. Lukins is the new chief inspector of mines in Newfoundland. Mr. Lukins has been with the Department of Mines and Resources for a year and formerly was assistant mine superintendent with Buchans Mining Company. He takes over his new duties from **Fred Gover** who is now deputy minister of mines.

D. J. Rogers has established a consulting engineering office at 41 New Forest Road, Forest Town, Johannesburg, Union of South Africa. He has had many years of experience in senior management capacities in Africa, dating back to 1934. Prior to that he was an engineer at Trepca Mines Limited, Yugoslavia. His most recent position was general manager of Macalder-Nyanza Mines Ltd. and Tangold Mining Company Ltd. in Kenya and Tanganyika, respectively.

Michael J. Messel has been chosen general manager of Lake Asbestos of Quebec, Ltd., Canada, a subsidiary of American Smelting and Refining Company. Mr. Messel is the former manager of the Vermont Asbestos Mines Division of Ruberoid Company.

Yap Yin Fah, Perak, Malaya councillor, is on a three-month tour of the United States. He will study local, state, and national politics and the American mining industry. The owner of seven tin mines, Mr. Yap will visit a tin smelting plant in Houston, Texas. He also plans to study mining in Colorado.

John O. Englund is the new superintendent of the beneficiation pilot plant for Marcona Mining Company in San Juan, Peru. Mr. Englund was formerly with the Erie Laboratory of Pickands Mather & Co. on the Mesabi iron range.

The Malayan Mining Employees' Union has recently completed the reorganization of its administrative setup with a "Big Four" to head its activities. The union represents 18,000 workers in five states of the Federation. The "Big Four" are **M. Arokiasamy,** chief industrial relations officer; **Ooi Thiam Siew,** chief organizing officer; **Kwa Boo Sun,** chief research officer and negotiating secretary; and **Inche R. A. Abdul Karim bin Adbul Rahman,** general secretary.

P. H. Anderson and **W. M. Frames,** of the Rand Mines/Central Mining (Corner House) group, Union of South Africa, have resigned from their directorships of General Mining and Finance Corporation Ltd. **R. B. Hagart** and **A. C. Wilson,** of the Anglo American group, have succeeded them. The technical staff of General Mining and Finance Corporation Ltd. (following the merger with the Strathmore group) now includes: **M. C. G. Meyer, B. M. Roberts,** and **S. Craib,** consulting engineers; **E. W. Gray,** consulting mechanical and electrical engineer; **Dr. N. L. Wilson,** consulting geologist; **D. L. Carson** and **D. G. Maxwell,** consulting metallurgists; **H. N. Hart** and **A. H. Johnstone,** additional managers.

H. C. Koch, of the Anglo American Corporation of South Africa, Ltd., has been elected a vice president of the Transvaal and Orange Free State Chamber of Mines in place of P. S. Hammond of the New Consolidated group, who has resigned.

Professor P.G.H.A. Fermin, expert on metallurgy and ore dressing, has been guest lecturer recently at the Technical University of Bandung, Indonesia. Others currently lecturing at the University are **Dr. T. H. F. Klompé,** speaking on general geology; **Dr. D. de Waard,** petrography; **Professor Macdivitt,** economic geology; **J. C. Klinkert,** metallurgy and ore dressing; and **Dr. P. Marks,** geology.

Mitsui Mining & Smelting Company, Japan has sent **Mr. Watanabe,** managing director, and **Mr. Omoto,** chief of their commerce department, on a tour of southern India, Central Africa, Rhodesia and the Belgian Congo. Accompanying them is **Mr. Saito** of Daiichi Busan. They will explore the possibilities of obtaining supply sources such as copper, lead, and zinc.

J. E. Manners, former general manager of Boulder Perseverance Ltd. and Kalgoorlie Enterprise Mines Ltd., is now general manager of Hill 50 Gold Mine N.L., Mount Magnet, Australia.

Robert Henri Carbonnier, civil engineer from France, is the expert selected by the Technical Assistance Administration of the United Nations to study present methods of mineral exploitation in Haiti and to advise on ways to improve these methods. Also he will assist in drafting legislation for a sound program of extension in mineral production in Haiti, being especially concerned with the grant of concessions to foreign companies operating in Haiti. Mr. Carbonnier, who was educated at the French Ecole Nationale Superieure des Mines, Saint-Etienne, has been chief engineer for a Greek chemical firm in Athens since 1950. Before that he directed graphite mines in France and Madagascar and a lead mine in Tunisia.

J. N. Ong, mill superintendent at Tsumeb Corporation Limited in South West Africa, has recently returned to the United States.

Yun Heung Paik, production director, and **Sang Kyu Lee,** section chief, of the Dai Han Coal Corporation in Seoul, Korea, recently visited the U. S. Lake Superior region and inspected underground mining methods on the Marquette and Gogebic iron ranges.

Dr. W. J. Busschau, manager of New Consolidated Gold Fields in South Africa, has been elected a member of the Gold Producers' Committee of the Transvaal and Orange Free State Chamber of Mines.

A. Blatchford has resigned his position with Emperor Gold Mining Company in the Fiji Islands, and has been appointed chief geologist with Clutha Development Limited at Sydney, Australia.

CHARLES SWEETWOOD returns from Israel this month where he has been assisting in the development of the potash industry for the J. R. Simplot Company of Boise, Idaho. Mr. Sweetwood is exploration manager of the phosphate division. Formerly he was mine superintendent of the Gay open pit phosphate mine, Fort Hall Indian Reservation, Idaho.

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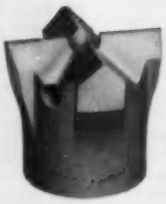

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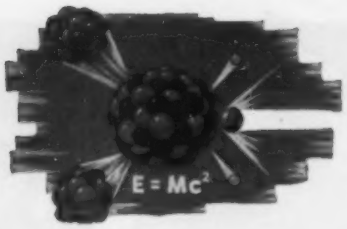


FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Phelps Dodge Negotiating With Lander Uranium Firm

A lease and option agreement between Phelps Dodge Corporation and the Wyoming Uranium Corporation of Lander, Wyoming is under consideration by stockholders of the latter firm.

Under the proposed agreement, Wyoming Uranium would lease its present holdings to Phelps Dodge for 75 percent of any net profits derived from ores mined and shipped from the property. During the term of the lease, Phelps Dodge would have the right to conduct geological and geophysical exploration, drilling, and mining on the property.

The option period is divided into an initial term and a second term. During the initial term, PD would agree to perform at its own expense not less than 68,000 linear feet of drilling on the properties. This must be done before December 31, 1956. If PD desires to extend the option period to July 1, 1957, PD must then do an equivalent of 14,000 additional lineal feet of drilling.

When and if such option is exercised, PD would immediately form a new corporation, and would designate 49 percent of the stock to shareholders of Wyoming Uranium. The latter would then be dissolved.

AEC Awards Contracts To Zirconium Producers

Three companies have been awarded five-year contracts to supply 11,000,000 pounds of zirconium at a total cost of about $75,000,000 to meet growing needs of the Atomic Energy Commission's reactor development programs, especially in Naval projects.

Winning companies are National Distillers Products Corporation, supplying 1,000,000 pounds annually; National Research Corporation, 700,000 pounds annually; and Carborundum Company, 500,000 pounds annually. This is in addition to Carborundum's present contract of 325,000 pounds per year; the company has also agreed to give the AEC priority on an additional 400,000 pounds of production a year.

New plants will be built by all three of the companies. National Distillers subsidiary, U. S. Industrial Chemicals Company, has contracted with the Bechtel Corporation for design and construction of a zirconium sponge plant in Ashtabula, Ohio with a 1,500,000 pound capacity. National Research announced its plant will be built near Pensacola, Florida at a cost of $5,000,000. Carborundum will build its multi-million dollar plant in Parkersburg, West Virginia. Production at the new plants will begin near the end of 1957.

The contracts are for fixed unit prices which are subject to revision within established ceilings at the end of each year of production. The companies also agreed to supply as much hafnium metal as can be produced in the processing of the zirconium.

Zirconium and hafnium requirements, which must be met during the period before production from the new plants begins, are expected to exceed present stockpile and production. To help meet these growing requirements Carborundum Metals Company, Incorporated, of Akron, New York, the AEC's current supplier, will increase its annual production from 200,000 pounds to 325,000 pounds. The U. S. Bureau of Mines plant at Albany, Oregon, which was the pilot zirconium production plant in the United States, will be reactivated to produce about 300,000 pounds annually beginning in August 1956. It will be operated by the Wah Chang Corporation of New York, under a contract expiring June 1958.

Why U_3O_8 Miners Like New Lime Schedule

The United States Atomic Energy Commission's revised uranium ore buying schedule for Moab and Monticello, Utah, has cut the lime penalty and made ore out of marginal material.

The new optional schedule is designed to allow shippers the choice of the standard lime penalty (maximum of $3.70 per ton) with payment for contained vanadium, or no lime penalty and no payment for vanadium. With low vanadium in ores shipped to these depots, vanadium payments had not offset high lime penalties in the past.

Lifting of the lime penalty is the result of metallurgical improvements and increasing use of carbonate leach circuits. Uranium Reduction Company is adding such a circuit to its mill under construction at Moab. The main acid leach circuit will be in operation this summer with the carbonate circuit early in 1957.

MINING WORLD has asked miners, mill operators, and the AEC the following questions regarding benefits under the new schedule. Several answers for the questions are also given.

Q. How much additional income per ton will you receive by shipping under new schedule?

A. Additional income for Big Indian producers is estimated to average $2.50 per ton. Producers in other tributary areas should receive an average of $2.75 per ton more. One company shipping 15 to 18 percent lime ores will gain $0.35 to $1.25 per ton; another company a maximum of $1.90 per ton.

Q. How much marginal material will become ore?

A. Total production in Big Indian area is expected to increase 13 percent. This is based on probable mining of several marginal ore blocks. Individual operating mines report an increase of 0 to three percent.

Q. Will the new schedule be an incentive for further exploration?

A. In general yes, but not always as some properties are completely drilled out. Definitely yes at others where exploration holes have intersected areas of near-marginal uranium content accompanied by extremely high lime.

Q. Do you think further adjustments are needed in the new purchase schedule?

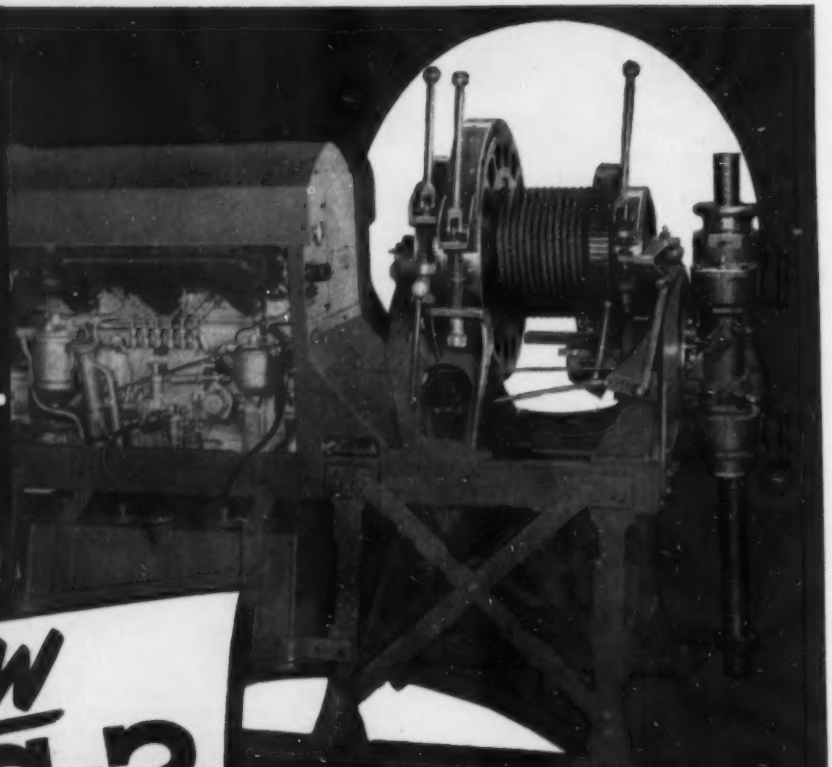
A. Those mines with low vanadium are well satisfied. Other mines would welcome payment for vanadium regardless of lime content.

Q. What are recommendations for future changes?

A. Research should be continued on the recovery of vanadium so that the miner will be paid for it with no penalty for lime.

The importance of the new schedule for the miner is best exemplified by Standard Uranium Corporation. In 1955 ore mined was 96,440 tons. Lime penalty paid was $456,298.48 or $4.74 per ton. Vanadium payment was $145,942.14 equivalent to $1.51 per ton. Total lime loss was then $310,356.34 which is $3.36 per ton.

DOWN to 3500 ft. with the NEW BBS-2 HOIST



NEW BBS-2SR HOIST BOOSTS CAPACITY TO GREATER DEPTHS

This is a "Special Duty" hoist to increase the capacity of the BBS-2 Drill where a travelling block can be used. This combination will enable the drill to handle 3,500 ft. of 'A' rods.

It features a 22" dia. x 3" wide brake drum mounted directly on the hoist drum. The self-energizing brake on this drum utilizes ¾" thick heavy duty "block type" brake lining.

The original planetary brake remains unchanged, thus one brake may be used to relieve the other under severe conditions.

The hoist drum itself is 30% wider than the standard heavy duty hoist drum. It will spool 95 ft. of ⅝" cable or 65 ft. of ¾" cable.

The ¾" cable is used for single line hoisting, while the extra capacity for ⅝" cable makes this hoist ideal for double line work.

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Mining Officials Call for Revised Depreciation Laws To Curb Rising Iron and Steel Prices

Officials of two top iron ore mining companies in the United States have warned that steadily increasing ore and steel prices are inevitable unless there is "prompt and realistic" revision of the depreciation laws.

Alex C. Brown, chairman of the Cleveland-Cliffs Iron Company, says that further increases in iron ore prices must come unless the government provides a more permanent solution to amortization of cost of new facilities to meet maximum demands when it occurs. Not only must large capital expenditures be made for better quality, he says, but additional capital must be made available for replacement of exhausted mines and of obsolete plant and equipment, expansion for increased production, and development of taconite and jasper beneficiation programs.

As long as the Internal Revenue Department permits charging off only the original costs over the life of the capital facilities, continues Mr. Brown, the result will be the recovery of only enough dollars to replace a portion of their former capacity. He indicated that this year iron ore shipments by vessel and rail will probably be close to 93,000,000 tons, or 3,000,000 tons higher than last year.

Roger M. Blough, chairman of the United States Steel Corporation, pointed out that his firm, at conservative estimates, will have to expand its capacity by an average of 1,000,000 tons a year for the next 10 years, in order to play its full part in supplying sufficient steel for economic growth of the nation and national defense.

"Before we can even talk about expansion, however, we must first arrange to keep our present facilities intact," Mr. Blough declared. "We must replace those that wear out and modernize those that become obsolete. And this, today, is our most difficult problem. This is where inflation has hurt us the most."

As a concrete illustration that replacement of facilities is U. S. Steel's foremost problem, Mr. Blough reported that an open hearth plant which cost $10,000,000 to build in 1930 will cost $64,000,000 to replace at today's prices. According to careful estimates by U. S. Steel engineers, the cost of replacing plant and equipment as it wears out or becomes obsolete will average $350,000,000 a year for the next five years at present construction prices. To add an average of 1,000,000 tons a year to the firm's capacity over the next 10 years would cost $150,000,000 annually "by the most conservative estimates."

"The root of the difficulty lies in the inadequacy of normal depreciation provisions of the law," says Mr. Blough. "The time has come, I think, when Congress should face up squarely to the fact that these depreciation provisions no longer serve the purpose for which they were intended. It is time to reappraise the law and to revise it realistically."

AIME Northwest Congress Draws Miners to Seattle

The Pacific Northwest Regional Conference of the AIME drew a record crowd of engineers and students to Seattle, Washington May 3, 4, and 5. More than 300 registered, including 35 mining engineering students from six western colleges and universities.

Dr. J. Gordon Parr, associate professor of metallurgy, University of Alberta, Canada, presented an entertaining, as well as informative, address which fully lived up to the promise of its title, "How Does the Metallurgist Get the Urge?"

Dr. Desmond F. Kidd, past president of the Canadian Institute of Mining and Metallurgy and president and general manager of Attwood Copper Mines, Ltd., spoke at the Mining Branch luncheon on "This Progress of Ours."

Grover J. Holt, general manager of ore mining for The Cleveland-Cliffs Iron Company, Ishpeming, Michigan, and president-elect of the AIME, spoke at the conference banquet. His address, "Indian Warpaint in our Lives Today," pointed up the progress in iron mining from the days when iron ore was used only for Indian warpaint.

Field trips to industrial plants in Seattle, Renton, and Tacoma were the final day's program.

Minerals Engineering Plans WO_3 Mill in Mexico

Minerals Engineering Company of Grand Junction, Colorado has acquired a controlling interest in Minas y Minerales, S.A. of Mexico which owns tungsten deposits in the state of Sonora. Plans are now being made to install a mill with an initial capacity of 400 tons per day at the mine which is expected to be in operation by the end of the year.

The property is located close to the Pacific Coast highway which connects Tucson, Arizona with Mexico City, and is about 450 miles south of Nogales. It is considered by the company to be unusually well located for low-cost operation and accessibility.

The mine has been developed sufficiently to disclose two ore bodies—the largest, approximately 160 feet wide and 800 feet long, contains an estimated 1.68 percent tungsten trioxide per ton in the form of scheelite, with substantial enrichments up to 8 percent within certain zones in the tactite ore body. The ore can be mined cheaply by open-pit operations, and milled by methods used successfully by Minerals Engineering in Montana.

South Korean Yung Wang Industry Company To Receive Rebuilt Yuba Gold Dredge No. 146

Yuba Consolidated Gold Fields, with a half century of placer gold dredging history in California, will sell one of its seven idle dredges to the United Nations Korean Reconstruction Agency. Known as Yuba Manufacturing Company's (a subsidiary) Dredge No. 146, it will be placed in service on the southwest coast of Cholla Namda to develop a placer gold deposit at Taechon-ni.

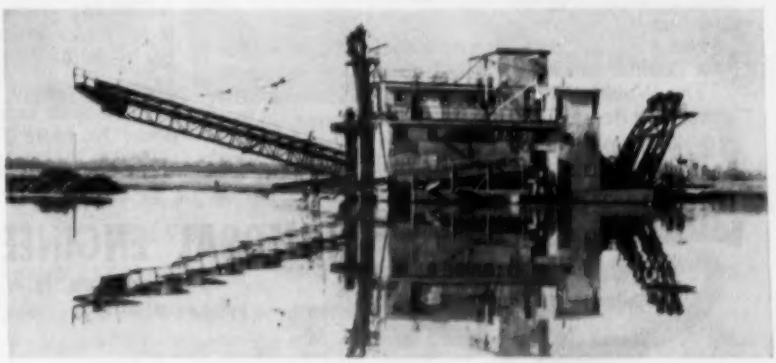
On the basis of test-drilling carried out by UNKRA engineers, the Agency estimates that the deposit contains 6,962,000 cubic yards of dredgeable ground containing nearly $3,350,000 worth of recoverable gold at the current United States market value. Part of the placer area is under water at high tide.

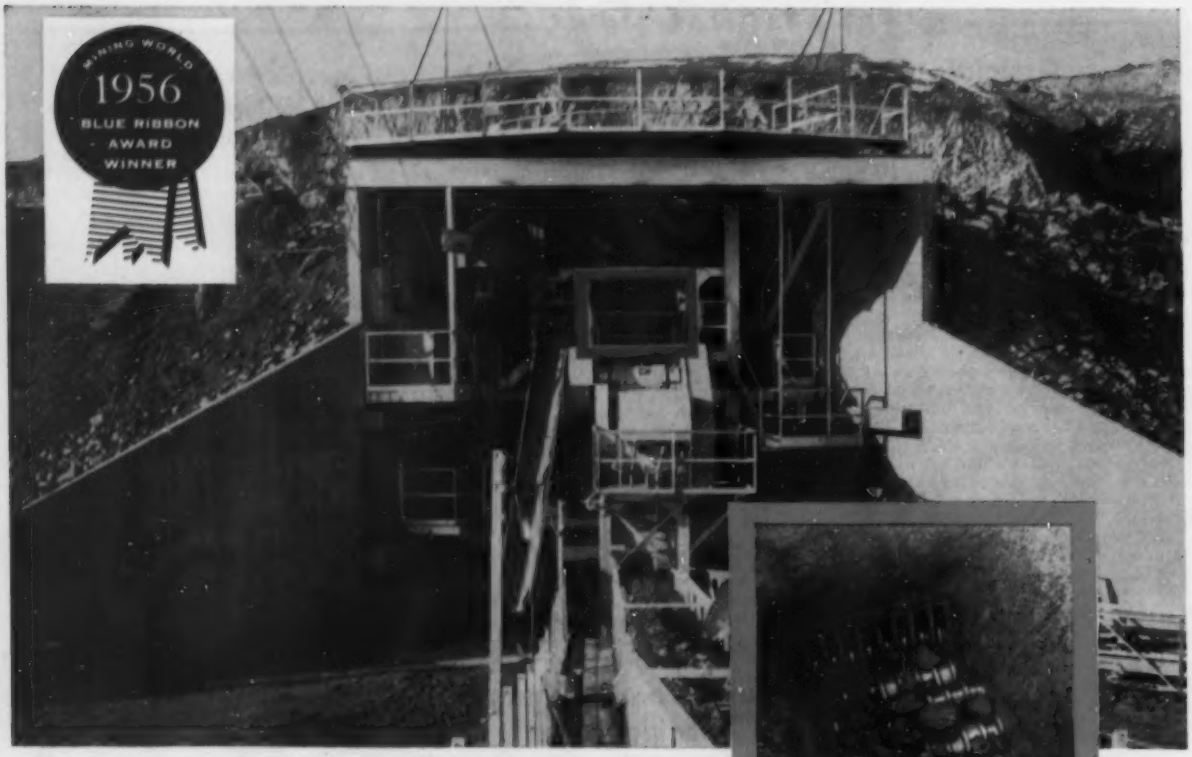
In the course of moving the dredge to Korea, it will be rebuilt and refitted in the Yuba plant at Benica, California, where its digging depth will be increased from 26 feet to 40 feet. Its spuds will be removed in favor of headline digging to permit better control in flat, sandy soil, with no rocks present. A new onboard power generating system will also be installed.

The dredge basically is a portable type with hull made up of separate pontoons. The bucket line has 90, six-cubic-foot buckets; the hull measures 112-feet long by 53 feet wide, when reconstructed; the weight of the whole dredge will be about 720 tons.

Gravel dredged up by the buckets will be fed into "gold-saving tables" where particles of gold will be caught and held in an amalgam with mercury. This concentrate will be taken ashore for further treatment.

Shipped knocked down into pieces convenient for easy handling at all transfer points, the dredge will be re-erected under the supervision of Yuba personnel who will also train a Korean crew to operate it. The Yung Wang Industry Company, with headquarters in Seoul, is financing the $510,000 purchase partly from its own resources and partly through a loan from the Korean Reconstruction Bank. The actual contract was concluded between the UNKRA and the Yuba company with the concurrence of the Korean Ministry of Commerce and Industry. Completion of the project is scheduled for spring of 1957.





Sticky muck can't blank this feeder

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UNIVERSAL WOBBLER

Top view of the Universal Wobbler indicated in above Pacific Coast mine

Eliminates feeder-screen maintenance. The only feeder able to separate fines from oversize while transporting muck.

Scalps as it feeds — without blanking

At a Pacific coast mine, the Wobbler is separating clay from ore so sticky it builds up 18 inches thick on hopper walls — yet the wobbler bars remain clean.

Not a roll grizzly with a new coat of paint — not a familiar machine dressed up to look different. The Wobbler Feeder *is* different because of the way it's designed and the way it performs — like nothing you ever saw before! Patented *oval* Wobbler bars are set alternately flat and upright and rotate in the same direction, all at the same speed. Spacing between bars is constant. As one turns down, the succeeding one turns up — churning of material by "wobbler" action separates fines from oversize as load moves forward.

Ideal for mills and concentrating plants

Used ahead of a crusher in place of an apron feeder and grizzly, the Wobbler removes all material under eight inches increasing crusher capacity 30 to 70 per cent.

Manganese steel Wobbler bars take shock loads of 50 tons or more. Capacities to 2500 tons per hour. No more than 15 horsepower required.

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NEW SOUTH WALES—*Zircon Rutile Ltd.* has applied for permission to enter and prospect 32,000 acres at West Rappville, 20 miles south of Casino. There is considerable interest in this development because Rappville is at least 40 miles from the coast and this represents the first application by a mining company interested in titanium-bearing sands for permission to prospect an area away from the the coastal beaches. Some of the sand deposits currently worked along the northern coast of New South Wales are in the form of raised beaches close to the present surf beaches. The Rappville area is mostly forest country, with some grazing, but Zircon Rutile Ltd. believes that, geologically, heavy minerals should occur in the area.

REPUBLIC OF THE PHILIPPINES—*Mindanao Mother Lode Mines Inc's* new flotation mill is in operation at Cabangan, Zambales. One ball mill unit went into production in January, and a second in mid-March, with output reaching 300 tons of copper ore per day in April. Shipments to the Japanese smelters also started in April.

NORTHERN TERRITORY—*Northern Hercules N.L.'s* new mill at Pine Creek is going through trial runs. In its first four-week period 930 tons were treated in 213 hours. Head grade of the ore was 15.4 dwts gold per ton and tailing 4.7 dwts. per ton. A drive on the mine's 200-foot level has been extended 26 feet north to 622 feet in ore averaging 41.3 dwts. over 54 inches and 10 feet south in ore averaging 32.5 dwts. over a width of 40 inches. The ore is patchy but reasonably high grade overall.

REPUBLIC OF THE PHILIPPINES—*Gabun-Paracale Mining Company* has concluded an agreement with *Pacific Equipment Corporation* of Manila giving the latter the right to mine and operate some 100 iron ore claims which Gabun-Paracale owns in Paracale, Camarines Norte. Pacific Equipment will provide the equipment and machinery needed to operate the claims, and will share the profits on a 50-50 basis with Gabun-Paracale.

WESTERN AUSTRALIA—In 1955, Western Australia produced 79.6 percent of Australia's gold with an output of 834,000 ounces. In the first two months of 1956, 160,773 ounces were deposited at the Perth mint, compared with 128,812 ounces in the same period of 1955. The *Sons of Gwalia* has resumed production and output of the *Great Western Consolidated* at Southern Cross is improving, so even better figures may be expected by the end of this year. Great Western, incidentally, has staked six leases at Nevoria near Marvel Loch formerly held by the Nevoria Company.

REPUBLIC OF THE PHILIPPINES—*San Mauricio Mining Company* has shut down its gold operations after 1955 showed an operational loss of Pesos 1,517,044. San Mauricio had been fourth among the country's gold producers before World War II, and resumed operations in 1952 with an authorized capital of Pesos 2,000,000.

MAKATEA ISLAND—In 1955, the island produced 225,000 tons of phosphate and exported 235,000 tons. The principal customer is Japan; however, India is reported to be a big purchaser in 1956. New equipment was placed in operation during the year.

TASMANIA—*Montana Silver Lead N.L.* at Zeehan has conducted a geophysical survey over a wide area, and diamond drilling of an anomaly in copper-nickel-bearing country has disclosed ore that may prove to be very important for Australia. Over a width of 13 feet on the 100-foot horizon, irregular, payable values were found, with 9.7 percent nickel and 4.0 percent copper over a width of 3 feet. Eighty percent of the drill core was recovered. The discovery is about seven miles from the company's silver-lead mine, the mill of which would be available for treatment of copper-nickel ore. At present Australia produces no nickel, though very small amounts have been mined in the Zeehan area in past years.

NEW ZEALAND—Because of power shortages, harnessing of geothermal steam is to be hastened at Wairakei. A contract has been let for construction of a 40,000-kilowatt plant. Testing is continuing in an attempt to prove 80,000-kilowatt capacity and larger drilling equipment is being obtained from the United States to enable deep bore holes to be properly lined.

REPUBLIC OF THE PHILIPPINES—*Benguet Consolidated Mining Company*

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Compare Rear-Dump Euclid performance with your present equipment before you replace or add to your hauling fleet. Your Euclid dealer has helpful facts and figures that show how "Eucs" can cut mine and quarry hauling costs and why ***Euclids are your best investment.***

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FOR MOVING EARTH, ROCK, COAL AND ORE

has called a special stockholders meeting to authorize the activation of a new company as a successor to the present firm. This will bring the company's corporate structure into line with current corporation laws in the Philippines, and will clarify the firm's legal status according to a recent Philippine Supreme Court decision. The company was originally chartered in 1903 under the old Spanish law for a term of 50 years. In 1953, stockholders voted to extend the company's life another 50 years. A question then arose as to whether the firm could continue under the old status or a company be organized as a successor, since the corporation law of the islands is now patterned after United States practice. It now appears that the company may not continue in its original form.

NEW GUINEA—Mineral production for the Territory of Papua and New Guinea in 1955 was as follows: fine gold 79,092 ounces; fine silver 44,713 ounces; fine platinum 10 ounces; manganese 20 tons. All gold output was by *Bulolo Gold Dredging Ltd.* Four dredges were in operation and treated 12,709,300 cubic yards for a recovery of 48,228 ounces. During the year some testing and trenching of extensive iron ore deposits on Suloga Peninsula, Woodlark Island, was undertaken. An airborne magnetometer survey was made in June and further work is under consideration. A comprehensive diamond drill program is in progress on the *Astrolabe Gold and Mineral* field near Port Moresby. There are many areas of copper mineralization on the field and ore bodies will be tested in depth. Some prospecting was carried out on Misima Island during the year.

WESTERN AUSTRALIA—An agreement has been made between *Tin and Strategic Minerals Ltd.* and *Western Queen (1936) N.L.* for the sale of the latter's plant and leases at Greenbushes. These leases are bounded on either side by Tin and Strategic's leases and so will be of great benefit. The merger seems to offer the best chance to date of satisfactorily developing the Greenbushes tin and tantalite deposits.

UNION OF SOUTH AFRICA—*Middle Witwatersrand (Western Areas) Ltd.* has placed more ground under option in the Leslie area west of Kinross. It now has a total of 119,088 claims under option in the vicinity of the towns of Delmas and Leslie, and to the south in the Standerton district. Drilling operations are now in progress in the Leslie area.

KENYA—*New Consolidated Gold Fields, Ltd.*, which holds numerous interests in East Africa, has purchased the *Murka* mine and the claims of *Kenya Kyanite* for £150,000. Kenya Kyanite is in liquidation and the purchase was made from the receiver and manager.

FEDERATION OF RHODESIA & NYASALAND—*Chibuluma Mines, Ltd.'s* new flotation mill has gone into production at Nkana South Limb, seven miles from Kitwe. It will produce both copper and cobalt concentrates. The mine, however, has been in production since last fall, and has been stockpiling ore. The copper concentrates will be trucked to Kitwe, for rail shipment to *Mufulira Copper Mines Ltd.'s* smelter at Mufulira, Northern Rhodesia. The cobalt concentrates will be stockpiled until completion of a plant currently being built by Chibuluma at Ndola. Estimated ore reserves at Chibuluma are 7,300,000 tons, averaging 5.23 percent copper and 0.25 percent cobalt. Annual ore output is estimated at 480,000 tons for an estimated metal output of 16,000 tons of copper and 500,000 pounds of cobalt.

UNION OF SOUTH AFRICA—*The Free State Saaiplaas Gold Mining Company Ltd.* has completed one of its three cementation holes to a final depth of 2,240 feet at the site of the No. 2 shaft where the collar has been completed. Another of the holes has been nearly finished, and the third has reached a

One of the 6 dredges offered. Digging depths range from 35′ to 80′ below water level; buckets from 8½ to 18 cu. ft.

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Country _____ Phone No. _____

depth of 1,735 feet (at March 31, 1956). These holes are being drilled to facilitate the sealing off of water-bearing fissures that would otherwise be encountered during drilling, thereby promoting dry conditions in the shaft. Construction of the concrete collar in the No. 1 shaft also has been completed. The two shafts are 4,000 feet apart, and located in the southeastern section of the lease area of 4,920 claims. No. 1 will be upcast for ventilation, and the No. 2, the largest circular shaft in the Union, will be downcast. The lined diameter of the latter is 27.5 feet. It will be the main hoisting unit with a monthly capacity of 125,000 tons. Actual sinking is not yet in progress; however, in both shafts the final depths will be 6,000 feet.

FEDERATION OF RHODESIA & NYASALAND—*Cam & Motor Gold Mining Company* is undertaking a £1,000,000 expansion program at its *Cam* mine. The main purpose is to facilitate mining below the present bottom level of 5,500 feet. The reef has been developed so strongly that the money for the expansion program is coming almost entirely from profits (except for £280,000 which was raised by a stock issue). A small amount of money is also being used to bring the nearby *Pickstone* mine back into production. This should add substantially to the company's earning capacity in the future.

BECHUANALAND PROTECTORATE—In 1955 the value of mineral production increased to £165,139 from the 1954 figure of £146,249, although actual output of three of the four major commodities decreased. In 1955 gold production totaled 560 ounces, as compared with 1,216 ounces in 1954; silver 189 ounces, compared with 292 ounces; kyanite 840 short tons, compared with 2,054 short tons; chrysotile asbestos 1,427 short tons, compared with 1,011 short tons in 1954. The asbestos was all produced from the *Moshaneng* mine near Kanye which is owned and managed by *Marlime Chrysotile Asbestos Corporation, Ltd.*, a subsidiary of *Marble, Lime and Associated Industries Ltd.* The gold, silver, and kyanite were produced in the Tati concession area, now under the control of the Glazer brothers.

FEDERATION OF RHODESIA & NYASALAND—The *King Edward* mine near Lusaka is being examined by *Nchanga Consolidated Copper Mines Ltd.*, and has shown considerable promise at the 450-foot level. Exploration work is being carried out both underground and by diamond drilling. To date a large tonnage of medium grade ore has been reasonably assured so that considerations for production are now underway. The occurrence, a straight chalcopyrite ore, was opened up in a small way many years ago on the 82- and 200-foot level horizons.

BELGIAN CONGO—*Union Miniere du Haut-Katanga produced* 234,500 tons of copper in 1955, compared with 223,791 in the previous year. Cobalt output was 8,500 tons, compared with 8,600 tons in 1954. Zinc concentrate production totaled 114,000 tons, and that of cadmium 165 tons; 81 tons of germanium were also produced.

SOUTH WEST AFRICA — *South Geduld Gold Mining Company Ltd.*, which is conducting exploratory operations in marine terraces for diamonds and on other copper claims, is now advancing lead-silver exploration in the Mount Ai Ais area.

FEDERATION OF RHODESIA & NYASALAND—*Kamativi Tin Mines Ltd.*, operating in the Gwaai area, has increased its capitalization from £700,000 to £3,000,000. The new money will be used to raise the present milling rate from about 60 tons per day to 1,000 tons per day, and also for further expansion later. A wholly owned subsidiary called *Kamativi Smelting & Refining Company* was formed in 1955. During the year a smelter for ingot tin production was also completed, and production began in May. Average monthly output has been about 35 long tons, and is expected to increase this year.

BELGIAN CONGO—*Union Miniere du Haut Katanga* will shortly undertake construction of the Luilu Works which will treat the rich copper and cobalt ores of its western mines. The plant will be located on the railroad line to the Atlantic port of Lobito and about 14 kilometers west of Kolwezi. Construction of this plant will bring about the building of new cities for the white and native staffs. The project will take about two years to complete, as the Luilu Works will be most important.

FEDERATION OF RHODESIA & NYASALAND—Mining men in the Federation are watching with interest the large-scale open-pit operations of *N'changa Consolidated Copper Mines Ltd.* where an open pit 800 feet wide and 3,500 feet long is being developed. Eight million metric tons of overburden have first to be stripped, using 9-ton shovels and 22-ton trucks. Production is expected late in 1956.

UNION OF SOUTH AFRICA—*African Metals Corporation Ltd.* has carried out preliminary geophysical and geological investigations of the copper property in the Messina area of *Northern Transvaal (Messina) Copper Exploration Ltd.*, and has entered into a five-year option agreement to carry out more detailed prospecting including shaft sinking. African Metals has the option to acquire the claim area for £250,000 cash or £125,000 in cash and a royalty on each long ton of ore mined.

SOUTH WEST AFRICA—*Sandwich Bay Diamonds Ltd.*, a name recently adopted by *Shares and Stock Holdings, Africa, Ltd.*, has acquired a concession over an area of 700 square miles. The property has a frontage along the Atlantic seaboard of 24 miles near Sandwich Bay, south of Walvis Bay. Exploration for diamonds has been started in the area which is known as Area No. 3.

FEDERATION OF RHODESIA & NYASALAND—*Messina (Transvaal) Development Company* has acquired an airplane in order to move around Africa with greater efficiency and to assist in extending of copper and other mining projects, if possible. In addition to their copper prospecting, the company is also currently investigating the *Bukwe* iron deposits in Northen Rhodesia and, as a result of further drilling and development, has proved high-grade surface hematite ore to persist at considerable depth. Options have been exercised over the 73 blocks of claims covering the three major deposits. The question under consideration at the moment is whether to combine with the *Rhodesia Iron and Steel Commission* in using the government's plant near Que Que, or to build a separate plant at Bukwe itself. Looking farther ahead, the firm has acquired options on two limestone deposits near

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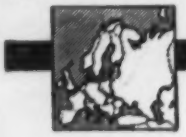
Bukwe which would be suitable for use in the production of pig iron if it is decided to undertake the Bukwe operations.



EIRE—The newly organized *Mining Corporation of Ireland*, a subsidiary of *Can-Erin Mines Ltd.* of Toronto, Canada, has begun test drilling at Beauparc, County Meath, and Castleblaney, County Monaghan. In an agreement with the Eire government, the corporation is committed to spend $100,000 on initial drilling for copper, but reportedly is willing to spend up to $5,000,000 in development if warranted.

SWEDEN—Swedish iron ore exports through the Norwegian port of Narvik totaled 966,000 tons in March 1956, the highest figure for any month since shipments were started through this port 55 years ago. The previous record was set in July 1953 when 946,000 tons passed through the port.

CYPRUS—*Cyprus Copper & Sulphur Company Ltd.*, a wholly owned subsidiary of *Esperanza Copper & Sulphur Company*, has received a new 1¾-cubic-yard excavator at the property which is expected to increase output from the Limni Section considerably. The first of two new drilling machines has been ordered to expedite operations in the opening up of additional areas around Kinousa. For the nine months ended December 31, 1955, total ore mined amounted to 36,720 tons from the Kinousa section, and 90,510 tons from Limni. Total shipments were 46,530 tons of Kinousa ore, and 7,770 tons of pyrite and copper concentrates from the Limni mill. Output from Limni had been curtailed by the shortage of excavating equipment and modifications in the milling plant, which is now producing pyrite concentrate with a copper content below 0.2 percent, and copper concentrate averaging 27 percent copper.

CORNWALL — *Hawkeswood Mining Company* which has been operating a small wolframite mine on the edge of Bodmin Moor in Cornwall, and *Mineral Recovery Ltd.* which has been recovering tin from beach sand, have both suspended operations.

U.S.S.R. — The Soviet Union expects that by 1960, with the end of the sixth Five-Year Plan, the country will be producing 53,000,000 more tons of pig iron or 3.6 times more than in 1940; 68,300,000 more tons of steel, or about 3.7 times more than in 1940; and 52,700,000 more tons of rolled steel, or four times more than in 1940. (Russia produced about 45,200,000 metric tons of steel in 1955.) In the sixth Five-Year Plan, metallurgists will be urged to increase sharply the production of alloy and low-alloy steels, electric steel, and other types of quality metals. Range of metal production will be greatly expanded. Large quantities of copper, lead, and aluminum will be required for electric power stations and expanded communications. There will be increases in output of nickel, tungsten, molybdenum, niobium, and other non-ferrous and rare metals.

NORWAY—In the Joma copper-pyrite district in Grong, it has now been de-

cided to undertake driving of a 6,000-foot adit this summer, along with some exploration work. Some work will probably also be done in the Gjersviken copper district not far from Joma. Geophysical prospecting is also being started in a new district to the south of the two mentioned above.

AUSTRIA—Erection and installation of a third oxygen converter has been finished at *VOeST (United Austrian Iron and Steel Works)* at Linz, province of Upper Austria. Presently a second mixer for pig iron with a capacity of 1,000 tons is under construction.

YUGOSLAVIA—The Soviet Union is reported to have offered Yugoslavia economic assistance in developing the copper ore deposits at *Majdanpek*, eastern Serbia. France has been negotiating with Yugoslavia on the same subject. The French are reported to have offered to supply mining machinery and plant (with United States backing) on credit at 5.0 percent interest. Repayment of the loan would be over a five-year period in copper produced from the mine. The Russian offer is said to provide more favorable conditions—2.0 percent interest over a 10-year period, with repayment not necessarily in copper, but also in other commodities to be agreed upon later. Yugoslavian plans for Majdanpek are said to call for annual output of 23,000 tons of blister copper, which, together with output from *Bor* copper mine, would bring the country's total to 55,000 tons annually.

WEST GERMANY—The *Maximilianhuette Sulzbach Rosenberg*, a private concern, is reported to be producing uranium ore from a mine close to the West German-Czechoslovakian border.

AUSTRIA—Austria's record output of magnesite in 1955 means an increase of 150 percent as compared with 1937. The country's *Aluminiumwerk Ranshofen* in Upper Austria belongs among Europe's largest aluminum plants with its new high capacity of 50,000 tons a year. About 35 percent of the production is exported.

YUGOSLAVIA—The Soviet Union has signed an agreement with the Yugoslavian government which provides Russian technical help for the construction of certain industrial plants. The Soviet Union will provide plans, equipment, and part of the material needed, and will send experts for consultation, construction, break-in period, and work control. The necessary credit will be given for 10 years at 2.0 percent interest annually. On this basis of this agreement, two lead mines and another mine will be rehabilitated; a 120,000-ton sulphuric acid plant will be constructed; a 100,000-kw power plant will be built; and a 250,000-ton superphosphate plant will be erected.

MEXICO—*Cia. Minera La Mojina, S.A.*, a wholly owned subsidiary of *Canamex Mining Corporation Ltd.* of Vancouver, British Columbia, is nearing the production stage. The property, in the state of Chihuahua, midway between Chihuahua and El Paso, has been under active development as a lead, silver, and gold producer since early in 1955. A 125-ton concentrator on the property is nearing completion and is expected to begin milling operations in July at an initial rate of 100 to 125 tons daily. Canamex is also exploring other Mexican properties, and plans an actively expanded mining program there later this year.

PERU—*Cerro de Pasco Corporation* is presently considering construction of an access road from the town of Huallanca to the *Antamina* copper deposit which it has been exploring for several years. The mine access road would be built particularly to move machinery and equipment into the mine site for further exploration. Antamina is reported to be a medium-sized deposit with about 20,000,000 tons of better than 1.0 percent ore.

MEXICO—Silviano Perez has started the operation of a 150-ton flotation mill at Gualterio, state of Zacatecas. It will be used to treat custom ore, as well as ore from his *Candelaria* mine located at Chalchihuites, about 10 miles southwest of the mill site. Mr. Perez reports that his ore averages about 300 grams silver, 3 grams gold, 7 percent lead, and 8 percent zinc per ton.

CUBA—The Ministry of Agriculture released the following production figures for various Cuban mines: *Fomento* mine in Caney, 560 tons of iron ore produced and exported, January to March, inclusive; *Abundancia* mine in Caney, 350 tons of iron ore produced and exported, January to March, inclusive; *Bella Marcia, Gloria*, and *San Juan* mines in Mayari, 349,405 tons of nickel produced in October to December, with exports totaling 711 tons of nickel oxide in powder form, and 5,306 tons in granulated form.

VENEZUELA—The *Aluminum Company of America* is reported to be interested in establishing an aluminum plant in the Guayana region of Venezuela near the Caroni hydroelectric plant. The new plant would treat bauxite found in the region of Upata, El Pao, and Uriman, containing up to 60 percent alumina, as well as the deposits in the Delta Amacuro Territory.

MEXICO—*Bishop Canyon Uranium Corporation*, which operates the *Hogback* group near Dove Creek, Colorado, has purchased the *Cia. Mineral del Yaqui, S.A.*, a Mexican firm in Chihuahua City. Work on rehabilitating the 35-ton mill at the *Santa Eduviges* mine has started, and track is being laid in the main tunnel of the mine. The district is Rayon, and the camp is Ocampo in the state of Chihuahua. This is an old camp, dating back to work by the Spaniards in 1760. The mine was once owned by *Sierra Mining Company*, and later by *Minas Chihuahua*. After complete geologic examination, some deep tunnel work and deep shaft work will be initiated. General superintendent at the operation is Jimmie Faulkner, Jr., and mill superintendent is Joseph N. Stevens.

PERU—*Sindicato Minera Rio Palanga* is planning to add an HMS plant to its mill facilities.

HAITI—*Reynolds Mining Corporation* will begin shipping bauxite to its Corpus Christi, Texas, operations shortly. Construction work at the Haitian project is about completed. A pier has been installed near Miragoane on the island's

"S. S. Allen Christensen" Joins Utah Fleet

Utah Construction Company, through San Juan Carriers Ltd., is building a fleet of iron ore vessels to service its Marcona Mining Company operations in Peru. The sister ships, "S.S. Harvey S. Mudd" and "S.S. Allen D. Christensen," already have been launched and others are planned. Shown above (left) is Mrs. Allen D. Christensen, wife of the president of Utah Construction, christening the ship named for her husband at the Tsurumi Shipyard located between Yokahama and Tokyo, Japan. In the background are Mr. and Mrs. Marriner S. Eccles; he is chairman of Utah's board of directors. At right, the 11,600-ton vessel is leaving the slip. Specifications of both ships are as follows: length (over all), approximately 655 feet; length (between perpendiculars), 625 feet; breadth (molded), 87 feet; depth (molded, to upper deck amidship), 46 feet 6 inches; gross tonnage, about 11,600 tons; dead weight, about 31,600 tons; summer load draft (molded), 34 feet; volumetric capacity of ore hold, about 540,600 cubic feet; speed (maximum, full loaded), 16.5 knots; cruising range, 7,900 nautical miles. These ships will be used to haul ore from Port of San Juan, Peru, to eastern steel mills.

south peninsula, about 80 miles from Port-au-Prince, and work is winding up on construction of storage facilities, a drying plant, power plant, machine shops, conveyors, and loading equipment. The deposits are five miles from the port, and extend over an area along a plateau approximately 2,500 to 3,000 feet above sea level. A 12-mile mountain road had to be constructed descending from an altitude of 3,000 feet. (See MINING WORLD, August 1954, page 57, for earlier details.)

VENEZUELA—According to *Orinoco Mining Company*, Japan will buy 750,000 tons of iron ore from Orinoco this year. She will send her own ships to the Port of Puerto Ordaz in Bolivar State for loading. Orinoco also reports it has sold 7,500,000 tons of ore for delivery during this year, and expects to increase the figure to 9,000,000 tons. The ore will go to the United States, Europe, and South America. In 1955, Orinoco's production reached 5,700,000 tons, almost all of which was sold to the United States.

PERU—*Cerro de Pasco Corporation*, with principal properties in Peru, has established a scholarship plan providing one year of graduate study in the United States. The scholarships will be awarded annually to graduate Peruvian technicians with a minimum of two years' service in the employ of the corporation. Three scholarships will be awarded each year, beginning with this year, and the amount will provide air transportation to the United States and return, full tuition, books, and a liberal maintenance allowance.

BRAZIL—*W. R. Grace Company* of the United States will join with a Brazilian firm, *Eriz S.A.—Produtos Magneticos e Metalurgicos*, to build a new metallurgical plant in Sao Paulo.

PERU—The *Vanadium Corporation of America* further curtailed ore production at its Peruvian properties at Mina Ragra during 1955; late in the year shipments were suspended. Mine development is being continued and the Jumasha mill is being maintained in a standby condition. This is to conserve the remaining reserves since adequate vanadium ore supplies are available from the expanded mining operations on the Colorado Plateau in the United States.

ARGENTINA—Topographical-geological surveys have been undertaken by a group of technical experts of the National Direction of Mines at the *Virorco* copper mine located about 25 kilometers from El Trapiche. Idle at present, the mine was first operated in 1860. The surveys are to determine the economic possibilities of further development.

BRAZIL—*Comissao Pro-Siderurgia em Vitoria e Laguna* has been studying the possibility of building three large steel plants in Brazil. The first will be built in Laguna, Santa Catarina State, close to the coal mines. Its annual capacity will be 450,000 metric tons of steel, and part of the output will be exported to Argentina, Uruguay, and Paraguay. The second plant, with double the capacity (900,000 tons), will be installed in the city of Vitoria, capital of Espirito Santo State. Its output will be distributed among the central states of Brazil. The third will be built in the central part of Minas Gerais State, close to the large iron ore deposits. According to the technicians, these three plants will produce annually 2,250,000 tons of steel . . . almost double

Brazilian production in 1955. In 1960, Brazil will be producing 4,500,000 tons which is larger than the output of Canada or Italy.

ARGENTINA—Numerous copper deposits exist in the western part of Argentina, but most of these are small and generally located in inaccessible places. The best known copper mines are: *Capillitas* (inactive) and *Las Estrellas* in Catamarca, *Lo Poma* in Salta, *Famatina* in La Rioja, *Salamanca* and *Las Burreras* in Mendoza. In Capillitas, proven reserves are 800,000 tons of ore containing 20,000 to 30,000 tons of copper. For the past 80 years, a plant has been at Capillitas for treatment of the ore. Copper mining started in Argentina around 1850, and remained active until around 1920 when the British operators ceased production at Capillitas and Famatina, the two most important in the country. A few deposits are being worked intermittently on a small scale. Reasons for the decline of copper mining in Argentina are attributed to: unreasonable exploitation of the deposits (extraction of the richest mineral by the fastest method), lack of roads and railways, and the irregular characteristics of the deposits.

MEXICO—The *San Rafael* mining cooperative, established more than 20 years ago at Pachuca, Hidalgo, has been officially liquidated by the Ministry of National Economy who has cancelled its franchise. The Ministry of Finance has assumed the society's debts, and all property has been transferred to the government-administered *Cia. Minera de Real del Monte y Pachuca*. One of the main reasons for the San Rafael's shutdown was the sinking of one of its more prosperous ore bodies, a tract valued at 25,000,000 pesos. The cooperative was never able to raise the 500,000 pesos necessary to recondition for operation.

KOREA—Since *Utah Construction Company* undertook to build a synthetic scheelite plant at the Sang Dong mine for the *Korea Tungsten Mining Company*, the initial phase of the project—the flowsheet draft—has been completed. After minor modifications in the digestion section, the flowsheet was approved by Korea. Utah will now proceed with the design phase of the work, and Korea Tungsten has started clearing of the plant site.

PAKISTAN—It is reported that Soviet Foreign Minister V. M. Molotov hinted at Russian offers to build a steel mill for Pakistan at a recent Pakistan Embassy reception in Moscow celebrating Pakistan's becoming a republic.

MALAYA—Production of tin concentrates for January and February 1956 are as follows: January 123,393 piculs containing 5,538 tons of tin metal; February 103,272 piculs containing 4,635 tons of tin metal. February output was lower because of the short month and the Chinese New Year holidays. As a result of the assays approved by smelters production during 1955, the Chief Inspector of Mines decided to base the metal content of tin concentrates produced in 1956 on an assay value of 75.4 percent. At the end of February there were 78 dredges in operation, along with 636 gravel pump mines and 72 other tin mines.

INDIA—The largest aluminum plant in India will be set up at Hirakud in the province of Orissa. Planned for an annual output of 10,000 tons, it will double India's present aluminum production. The new smelter will be financed through bank loans and $4,000,000 of convertible unsecured notes, half of which has been subscribed by *Aluminium Limited* of Montreal, Canada.

PAKISTAN—Officials of the United States Atomic Energy Commission have been discussing with Pakistan officials the research reactor which will be built in Pakistan as a joint effort of both countries. Construction of the reactor and training of personnel to staff the center will take about two years. Meanwhile, key scientists are being sent to the United States for advanced instruction in atomic energy.

KOREA—Under an agreement between UNKRA and the Republic of Korea, responsibility for operation of the UNKRA Mineral Assay Laboratory near Taejon will be taken over by a Korean director on June 30 of this year. On that date, too, complete physical, legal, and operational control of the lab and its equipment will be transferred to the Mining Bureau of the Ministry of Commerce and Industry. Two international technicians will remain at the lab until June 1957, however, to advise in the work. The lab

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has been in operation since March 1954, during which time it has examined more than 5,000 samples to analyze mineral content and grade.

JAPAN—The start of flash smelting operations at *Furukawa Mining Company's Ashio* mine took place recently. The construction work had been underway since last September. With this flash smelting process which was developed by the Finnish *Outokumpu Company*, Furukawa expects to utilize the waste gases while also eliminating a troublesome smoke problem in the vicinity of the plant. Furnace capacity is about 175 tons per day, producing 800 tons of blister copper per month, and 5,000 tons of sulphuric acid monthly.

CEYLON—A complete aerial survey is to be made of Ceylon's natural resources over the next two years following an agreement reached between Ceylon and Canada within the framework of the Colombo Plan. Aerial photographs will be taken over the length and breadth of the island by a Canadian firm specializing in this work. These will be developed and studied by technicians in a laboratory which will be set up for this purpose. Evaluations will be made of rock formations and forest, and a group of agricultural experts will make a study of a river basin area with a view to inaugurating special irrigation projects. With the help of the photographs, plans will also be drawn up for the reconstruction of the town of Kandy.

INDIA—Nearly 27,000,000 tons of iron ore are said to occur in the Tomaka and Kansa areas of Cuttack district in Orissa, according to a preliminary survey carried out by the Geographical Survey of India. A more detailed study is planned.

MALAYA—The management of the *Pacific Tin Consolidated Corporation* has closed down its dredge at Kota Bharu in the Ipoh area, and has made an offer to find employment for the 136 workers affected by this termination. Pacific Tin's net income for last year was $342,992, as compared with $721,730 in 1954. Sales of tin in 1955 amounted to 2,540,640 pounds at an average price of 90 cents, compared with 3,983,206 pounds at 87 cents in 1954. Improved conditions in some Malayan areas permitted a limited amount of jungle scouting during the year, but no actual prospecting was undertaken. At the end of the year, prospecting permits for certain remote areas in Malaya were offered, and investigations are being made to determine whether it would be practical to resume full-scale tin prospecting in 1956.

NORTH AMERICA

BRITISH COLUMBIA—*Reeves MacDonald Mines Ltd.* has started development work from the bottom of its 650-foot shaft at Remac. The firm is currently milling about 1,200 tons of ore daily, with all of the mill feed being drawn from above the main haulage level. As of July 1, the company will start shipping concentrates to the *Bunker Hill Company's* smelter at Kellog, Idaho.

QUEBEC—*Copper Rand Chibougamau Mines* has been formed by *Copper Cliff*

Consolidated Mining Corporation and *New Royran Copper Mines* to develop part of the adjoining property of both companies in the Chibougamau district. About 3,000 acres are included in the transfer with Copper Cliff contributing 1,700 acres, and retaining about 2,500 acres. New Royran holds 55 percent of the new firm and Copper Cliff 45 percent. Necessary funds to prepare the property for production at a rate of 5,000 to 7,000 tons per day will be provided by the parent companies. Permanent buildings have been erected and shaft sinking is in progress on the westerly and easterly portions of the property. It is also planned to sink a third shaft on the southeasterly portion designed to handle production on a larger scale.

ALASKA—*Yukon Placers*, a partnership of Leonard Stampe, Chuck Herbert, George Ramstad, Harold Schmidt, and Glen Franklin, has returned to Fairbanks to prepare for the new mining season. The company's operations are on the *Livengood Placers* ground outside of Fairbanks. Dragline and "cats" will be used at Livengood, as well as at Dawson and the Sixty-Mile dredge operation.

MANITOBA—*Hudson Bay Mining & Smelting Company Ltd.* reports a new strike of major importance at its *Snow Lake* property about 70 miles east of its major mines and plants at Flin Flon. Drilling to date is said to have indicated zinc, gold, copper, and silver in commercial quantities with zinc predominating.

NORTHWEST TERRITORIES—By the end of this month, *Rayrock Mines* expects to begin shaft sinking from the adit level 225 feet below the surface at its uranium-bearing property in the Marian River area. A large amount of rock excavating is being carried on to make room for a hoist, headframe station, ore bins, and haulageway. Crushing and acid plants are under construction, along with camp and plant buildings. The Dominion government has agreed to provide $140,000, or half the estimated cost of building a 35-mile truck road from navigation on the Great Slave Lake to the Rayrock property. Power will be brought in by a 22-mile line from the government plant at Big Spruce Lake.

ALASKA—*Yukon Consolidated* at Dawson, Yukon Territory, will be operating seven dredges in the Dawson area this season, according to Arnold Nordale, general manager. Some road work is expected to be undertaken on the Forty-Mile Dawson Road this summer. *Gold Placers, Inc.* expects to start its dredging as soon as Coal Creek begins to thaw. Emptying into the Yukon River above Circle City, Coal Creek is usually about 10 days behind the Fairbanks area in thawing.

BRITISH COLUMBIA—The 48-claim *Lead Mountain* property near Spillimacheen will be explored jointly by *Giant Mascot Mines, Ltd.* and *Consolidated Mining and Smelting Company of Canada, Ltd.* Production at Giant Mascot's lead-zinc mine six miles to the southeast is about 18,000 tons monthly. Concentrates now are going to Cominco's smelter at Trail.

MANITOBA—A three-compartment shaft will be sunk to a depth of 650 feet by the *New Manitoba Gold Mines* at its *Cat Lake* property. The company is reported to have outlined 1,200,000 tons grading 0.65 percent copper and 0.23 percent nickel by diamond drilling. Preliminary metallurgical tests have shown that a bulk copper-nickel concentrate can be produced with a recovery of 96 percent, and a further separation to produce separate nickel concentrate and copper concentrate appears feasible. A milling rate of 800 tons per day has been recommended.

ONTARIO—New records were set by *The International Nickel Company of Canada Ltd.* in 1955 for net earnings, dividend payments, deliveries of nickel to the Free World, and ore mined from underground. Operating for the sixth successive year to the limit of its capacity for producing primary metals, the company delivered 290,463,000 pounds of nickel and 263,189,000 pounds of copper. Nickel deliveries showed an increase of more than 8,000,000 pounds over the record deliveries of 1954 and 39,000,000 pounds over 1953. In addition, the company made available 10,400,000 pounds of metallic nickel by converting sinter and concentrates supplied by other producers. Inco mined 14,247,000 tons of ore, almost equalling the record established in 1954. Tonnage of ore mined from underground was 12,759,000 tons. During the year, special steps were taken to make available an additional 3,500,000 tons of ore for mining by low-cost, open-pit methods, and development was started at the *Creighton* mine for mining below the 68 level, which is 5,425 feet below the

surface. When completed, this will constitute the world's deepest nickel mining operations. By January 1956, the first unit of the company's new $19,000,000 iron ore recovery plant was completed near Copper Cliff, Ontario; when in full production, it will have an output of 250,000 tons of iron ore per year. First shipments of sintered pellets of iron ore were made in February for open hearth production of steel by the *Algoma Steel Corporation Ltd.*

NEW BRUNSWICK—*Brunswick Mining and Smelting Corporation Ltd.* has been having difficulty in developing a satisfactory milling process for its zinc-lead-silver ore. The pilot mill which was placed in operation in February 1955 was shutdown June 1 because results were unsatisfactory, and an extensive research program was initiated with the assistance of Battelle Memorial Institute. Procedures worked out will now be tested this spring in the pilot mill. Any decision regarding construction of production facilities will be dependent upon the outcome of the pilot tests.

QUEBEC—*National Gypsum Company* has announced that development work will begin soon on a new multi-million dollar asbestos mine and plant at *Thetford Mines*, 75 miles southwest of Quebec City. The new mine and plant will supply asbestos fiber to National Gypsum's three asbestos-cement plants in the United States. The firm purchased a tract of land from *Bell Asbestos Mines Ltd.*, a subsidiary of *Turner-Newall*, London, and has since acquired additional land making it a 500-acre tract. The first of three new ore carriers for National Gypsum's developments near Nova Scotia has been delivered and the other two will be arriving soon. These vessels will transport raw gypsum rock to the processing plants in the United States.

BRITISH COLUMBIA—A third potline is nearing completion at the *Aluminum Company of Canada's* Kitimat smelter 400 miles north of Vancouver. It will increase production from 90,000 tons a year to 120,000. The goal is 330,000 tons by the end of 1959.

ALASKA—Three men have formed a partnership to resume dredging on Caribou Creek in the Salcha area where the *Brinker-Johnson Company* dredge was shutdown three years ago after running out of pay gravel. Apparently additional gravel has been located. One of the partners in the venture is the former dredgemaster for Brinker-Johnson.

QUEBEC—*Copper Cliff Consolidated Mining Corporation* and *New Royran Copper Mines Ltd.* have formed a wholly owned operating subsidiary, *Copper Rand Chibougamau Mines Ltd.*, to develop 3,000 acres in Quebec's Chibougamau area. The firms have subscribed $5,000,000 which will be used to prepare for large-scale production and to determine the tonnage capacity of the initial milling plant. Another $20,000,000 may be borrowed to bring the properties into production at a rate of 5,000 to 7,000 tons per day.

U.S.A. Metal & Mineral Prices

METALS

		May 18, 1956
COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	46.00¢
	Lake. Delivered, destinations, U.S.A.	46.00¢
	Foreign Copper. Valley basis	46.00¢
LEAD:	**Common Grade.** New York	16.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$201.75
	Prime Western: F.o.b. E. St. Louis	13.50¢
	Prime Western; Delivered, New York	14.00¢
	Tri-State Concentrate, 60% zinc, per ton	$89.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	25.90¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98% (per pound)	$11.00-$14.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Velasco, Texas, per pound	34.50¢
MERCURY:	**Flasks.** Small lots, New York	$268.00-$270.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery, Port Colbourne, Ontario	64.50¢
SELENIUM:	**99.5%** per pound	$13.50-$15.50
THORIUM:	**per kilogram:**	$43.00
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	97.125¢
TITANIUM:	**99.3%** + Grade "A" Sponge (Price per pound)	$3.25
URANIUM	**Nominal, per kilogram**	$40.00
U-235:	**Nominal,** per kilogram	$11,000.00
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.50¢ per ounce
	Foreign Handy Harmon	91¢
PLATINUM:	**Per Ounce**	$103.00-$107.00
ZIRCONIUM:	**Sponge, Per Pound,** Nominal	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO. F.o.b. mine, Colorado** $47.00 per unit. **Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.**
CHROME ORE:	**F.o.b. railroad cars eastern seaports. Long tons dry weight.** **African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio** $45.00-$46.00. **African (Transvaal). 48% Cr_2O_3. No Ratio** $31.00-$32.00. **Turkish,** 48% Cr_2O_3. 3 to 1 chrome-iron ratio $53.00. U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.
COLUMBIUM-TANTALUM ORE:	**At United States small lot beryl purchase depots. $3.40 per pound contained** combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)
IRON ORE:	**Lake Superior. Per gross ton Lower Lake Ports**
	Mesabi, Non Bessemer, 51.5% Fe. $10.85
	Mesabi, Bessemer, 51.5% Fe. $11.00
	Old Range Non Bessemer. $11.10
	Old Range Bessemer. $11.25
	Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit 22.00¢
MANGANESE ORE:	**Metallurgical grade.** 48 to 50% Mn. Long ton unit $1.30
	Metallurgical grade. 46 to 48% Mn. Long ton unit $1.27
	Metallurgical grade. 45 to 46% Mn. Long ton unit $0.95
	Chemical grade. 80% MnO_2. Per Ton $70.00. **Domestic** U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.
MOLYBDENUM CONCENTRATE:	**90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained** molybdenum, plus cost of containers $1.10
TUNGSTEN CONCENTRATE:	**Domestic. 60% WO_3** Per short ton unit $63.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite) $34.00
	Foreign. South American, Spanish, Portuguese $33.00
URANIUM ORE:	**Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S.** Dakota, Riverton, Wyoming, Tuba City, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. Special lime schedule applies at Monticello and Moab. No lime penalty with no vanadium payment or lime penalty with vanadium payment.
VANADIUM ORE:	**Carnotite-Roscoelite. V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, and Bluewater. Shiprock has no limit on V_2O_5 to U_3O_8 ratio** and all contained V_2O_5 is paid for ..... Per Pound V_2O_5 $0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots** $12.50. **Oil Well grade. Packed in 100 pound paper bags** $14.00
FLUORSPAR:	**Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b.** Illinois-Kentucky mines $32.00-$35.00. **Mexican.** 70% f.o.b. border $24.00-$24.50. **European,** Atlantic Ports, 70% $33.00-$34.00. **Acid Grade.** 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado $47.50-$50.00
PERLITE:	**Crude: F.o.b. mine per short ton** $3.00 to $5.00. **Plaster grades. Crushed and sized. F.o.b. plants** $7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas $25.50. **Export** $30.50

LONDON METAL AND MINERAL PRICES

		May 18, 1956 Per Long Ton		USA Equivalent cents per pound[1]
COPPER:	**Electrolytic spot**	£351	0s 0d	43.87¢
LEAD:	**Refined 99%**	£111	0s 0d	13.87¢
ZINC:	**Virgin, 98%**	£94	5s 0d	11.78¢
ALUMINUM:	**Ingot, 99.5%**	£189	0s 0d	23.625¢
ANTIMONY:	**Regulus, 99.6%**	£210	0s 0d	26.25¢
TIN:	**Standard, 99.75%**	£751	0s 0d	93.88¢
TUNGSTEN:	**Long ton unit, 261 $**	$36.54 per long ton unit		

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

Drum Lift Makes Drum Handling Easy

A new, improved drum lift which enables one man to handle steel drums (55 and 30 gal.), fibre drums (18- and 23-inch diameter), and acid carboys (13 gal.) has been announced by the manufacturer, Sterling, Fleischman Company.

Sturdy, of all-steel construction, the Sterling Drum Lift is rated at 750 pounds capacity. Lifting power is supplied by a foot-operated hydraulic jack. Drums can be raised for pouring to a height of 53 inches. They may be stacked two-high vertically. The center of gravity of the drum is always maintained within the four casters, making it impossible for the lift to overturn. Circle No. 64 for further information.

Wild Heerbrugg Features N-3 Precision Level

This Wild instrument is designed to meet the highest requirements in precision, convenience and all around performance under the most rugged field conditions.

It is particularly easy and fast to set up and operate. With the Wild Invar precision leveling staff, the N-3 has an accuracy of plus or minus 0.01 inches in one mile of single leveling. The telescope, internally focused and with coated lens, is said to have remarkable luminosity and the unusually high magnifying power of 42X. Centering is accomplished by means of the standard Wild prism system in which the bubble ends are brought to coincidence. The bubble image is observed through 2X magnification, resulting in extreme accuracy without eye fatigue. Circle No. 62 for further information.

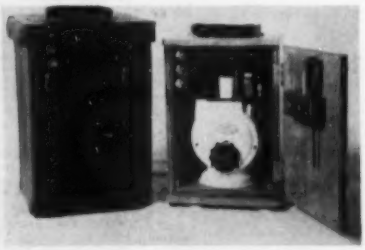
New Canadian Firm Uses Electromagnetic Detector

In the April issue of MINING WORLD, the name of the firm using this detector was incorrect. The instrument was developed for and is being used by Aerophysics of Canada Limited. Below is a re-run of the item with the name of the correct firm.

A new Airborne Electromagnetic Detector, developed for use by Aerophysics of Canada Limited, is currently in use by this company. The electromagnetic system uses a coil of wire to transmit an alternating field which induces a secondary field in a conducting body such as massive sulphides. With this system, the transmitter is towed in a bomb at the end of a 500-foot cable. The plane flies about 500 feet above the ground and complete records are taken of the output of the EM equipment, aircraft altitude, and simultaneously aerial photographs are taken of the ground below. Tests have shown a high sensitivity to sulphide ore and good discrimination against over-burden. Circle No. 76 for further details.

Gasoline Powered Drill for Multi-Purpose Use

A combined rock drill and breaker, available from Stanco Manufacturing & Sales Company of Los Angeles, the Pionjar BRH 65 is a machine for general purpose use. The drill weighs only 86 pounds, is powered with a built-in gasoline engine. Drilling capacity, as rated by the manufacturers, is 16-inches per minute with a 1.06-inch bit. It is guaranteed to drill to a depth of 13-feet in granite. The machine is equipped with a floatless carburetor making it possible to drill from a horizontal position or at angles 45° above horizontal. Conversion from rock drill to breaker takes only a few minutes. Two standard sets of steel are supplied. One for drilling to a depth of 4 feet, and the other to a depth of 11½ feet. For further information circle No. 79.



New Magnetometer For One-Man Prospecting

The Radiac Company, Inc., announces the availability of the Sharpe Model A-2 Vertical Force Magnetometer; a Schmidt-type magnetic balance for precise measurement of the vertical magnetic field intensity of the earth.

The A-2 has a permanently attached compass for orientation to permit complete one-man operation, resulting in a 50 percent savings in time and cost of conventional two-man surveys.

The instrument has a sensitivity of 15 gammas per scale division and an intensity range of 0 to 15,000 gammas, which may be increased by the use of greater strength auxiliary magnets. The balance system utilizes permanent magnets of a newly developed alloy to insure high sensitivity and stability. The magnetometer is supplied with temperature compensator, specially constructed tripod for operation in snow, auxiliary magnets and magnet holder, carrying case, and adjusting tools. Circle No. 63 for full information.

New Sales Representatives For Mining Industry

THE ORE & CHEMICAL CORP., New York City, whose Mining & Milling Machinery Division recently introduced the OCC Vessel Heavy Media Separator, has appointed the following sales representatives for the metallic and non-metallic mining industry, it is learned from Paul C. Cayard, Vice-President: The Galigher Co., Salt Lake City, for the territory west of the Rocky Mountains; Continental Sales & Equipment Co., Hibbing, for Minnesota, Wisconsin and Upper Michigan.

SUSPENDED FEEDERS: All Hardinge Feeders from 100 pounds per hour, to 100 tons per hour are suspended from the feed bin which eliminates costly feeder support structure, and provides accessibility to equipment following feeder. All sizes of disc and belt feeders are available. Circle No. 1 for bulletin describing Hardinge complete feeder line.

FREE BIT CATALOG: Spang & Company has recently published a new catalog featuring their line of churn drill bits, replacement blade sections, and Spang reamer type pilot bits for drilling large diameter holes. Much valuable information is contained in this brochure. Get yours, circle No. 2.

IMPROVED FILTRATION and settling by powerful flocculation at any pH is possible with the use of American Cyanamid Company's Aerofloc reagents. According to the company Aerofloc reagents are effective at concentrations as low as 0.1 to 5 ppm, or 0.01 to 0.1 pounds per ton dry solids. For additional information circle No. 3.

DIAMOND BIT CATALOG: A new diamond bit catalog featuring Truco Diamond Bits has recently been published by the Wheel Trueing Tool Company. The book features the complete line of Truco Diamond Bits including coring, blast hole, pilot bits and many others. Circle No. 4 for your copy.

PRIMACORD: Many types of Primacord are available from the Coast Manufacturing & Supply Company, among them are plain, reinforced, wirebound, and plastic. Primacord provides you with safety, simplicity, and durability. For further information on Primacord and other blasting accessories circle No. 5.

LARGER PAYLOADER: A larger model "HO" "Payloader" tractor-shovel with numerous new features has just been announced by the Frank G. Hough Co. Having a heaped capacity of 2¼-cubic yards and a struck capacity of 1¾-cubic yards, the Payloader features power shift transmission and torque convertor. Also new torque-proportioning differentials combat wheel slippage. Circle No. 6 for illustrative brochure.

CRUSHER BULLETIN: The operation and design features of Standard and Short Head Type Symons Cone Crushers are described in complete detail in a new, 24 page, three color bulletin just published by Nordberg Manufacturing Company. Circle No. 7 for your copy.

UNIVERSAL THEODOLITE: The new Wild Heerbrugg T-2 Universal Theodolite features precision, speed, versatility, and ease of operation. Reading on both circles is direct to one second. Other features are optical plummet centering and large field of view. Numerous accessories add to its work potential. Circle No. 8 for copy of descriptive brochure.

VACSEAL PUMPS: Rubber-lined and alloy type Vacseal pumps are available for you in sizes ranging from 20 to 3,000 gpm. Featuring vacuum design, which is its capacity to handle acids, slurries, and suspensions without gland water. Materials pumped with Vacseal do not come in contact with the shaft or shaft sleeve when in operation, thus reducing wear of vital parts. For informative booklet circle No. 9.

BELT REPAIRS are made simpler and stronger with the new Flexco Belt Fasteners and Rip Plates. Flexco fastners make strong, durable butt joints, trough naturally, distribute pull and tension evenly. Get the full story from a new Flexco bulletin by circling No. 10.

SLUSHER BULLETIN: Alloy Steel & Metals Company have recently published a new bulletin featuring their Pacific Slushmaster Scrapers. This Catalog gives complete information on all types and varieties of scrapers made by the company. Send for your copy today. Circle No. 11.

TUNGSTEN CARBIDE BITS: Tungsten Carbide Rock Bits are the subject of a new brochure issued by the Joy Manufacturing Company. All types and sizes of carbide bits are described in this informative Bulletin. Circle No. 12 for your copy.

WELDING HANDBOOK: A new 140 page Pocket Data Book (TIS 2575) featuring simplified welding procedures for every base metal is now available free from Technical Information Service, Eutectic Welding Alloys Corp. The book covers 120 welding rods, electrodes and welding compounds. Circle No. 13 for your copy.

BEARING CATALOG: A new 72 page catalog on Shafer Self-Aligning Roller Bearings has just been published by the Chain Belt Company. The new catalog contains specification and data pages on all models of Shafer units. Circle No. 14 for your copy.

MOVALLS or End-Dump Trucks? is the title of a four-page folder just released by the C & D Division, Yuba Manufacturing Company. It compares end-dump trucks and positive-ejection Movalls on 11 different points and is liberally illustrated with action photos. Circle No. 15 for your copy.

PORTABLE CRUSHING PLANT developed by the Gruendler Crusher & Pulverizer Company, is described in a new booklet. The booklet features operational data on a portable crushing plant complete with jaw crusher, vibrating screen, and conveyor. Mounted on pneumatic or steel tires, the unit can be compactly folded for easy transport. Circle No. 16 for this informative booklet.

BULLDOZER CUTTING EDGES: A catalog is available on the complete line of Hensley parts and cutting edges. The catalog features information on such items as Scraper Rippers, Dozer Rippers, Bucket and Shovel Teeth, and many other heavy-duty earth cutting tools. Circle No. 17 for your copy.

TRAXCAVATOR NEWS is the title of a new brochure presented by Caterpillar. The leaflet describes the new No. 977 Traxcavator. This 2¼-yard, 100-hp front end loader, Caterpillar's largest, incorporates several advanced features, including the oil clutch and automatic kick-out mechanisms. Complete specifications are contained. Circle No. 18 for your copy.

LIVE DRIVE hydraulic control operate the hydraulically operated ripper for the D-8 tractor. A new brochure on this subject is now available from the Caterpillar Tractor Co. Fast effective ripping is possible with this unit. Circle No. 19 for your copy.

NON-FERROUS METALS equipment is featured in a new catalog published by the M. H. Treadwell Company, Inc. The book describes many types of smelting equipment and accessories for the non-ferrous metal industry. Circle No. 20 for your copy.

NATIONAL STEEL PIPE is described in a new brochure published by the United States Steel Corp. According to the manufacturer the pipe threads and cuts easily, makes sound joints, coils and bends well, and is rigidly controlled throughout the entire manufacturing process. Circle No. 21 for further information, and your copy of the bulletin.

FREE TECHNICAL DATA catalog for 1956 is now available from the Lefax Publishing Co. The catalog covers all subjects available in the handy reference

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books. Every branch of engineering is treated authoritatively, and comprehensively. Circle No. 22 for your copy.

HELPFUL HINTS on maintenance of initial pump efficiency, and choosing a dredge pump that best fits a particular need, are discussed in a new bulletin describing the "GA" ad "GAF" dredge pumps of Morris Machine Works. The bulletin outlines the 24 models in this line, ranging from 6-inch to 20-inch size. Circle No. 23 for your copy.

MODIFIED BIT DETACHER: A modification in its BD-282 Bit Detacher has been announced by the Le Roi Division, Westinghouse Air Brake Company. Used to remove LeRoi-Cleveland CRD and Vacu-matic one-use bits, the detachers are now manufactured with a plate covering the bit and the end of the steel, a safety improvement over former models. Circle No. 24 for additional information.

LET'S TALK TRACTORS is the subject of a new Caterpillar booklet featuring the D6, D4, and D2 tractors. The brochure contains many useful operating and maintenance hints, as well as a complete list of attachments available for the above tractors. Circle No. 25 for your copy.

SAFE LOADS FOR SLINGS at various angles is covered in a new booklet published by the Macwhyte Company. The bulletin lists the safe loads for slings of twenty sizes wire rope when used at various angles of applications. Information covers slings with capacities ranging from ½ to 48.7 tons safe load. Circle No. 26 for your copy.

GEARMOTORS AND MOTOGEARS: A new catalog describing a completely new line of Gearmotors and Motorgears, in keeping with new NEMA motor sizes which deliver more horsepower per pound, has just been released by Link-Belt Company. Circle No. 27 for your copy.

SPLICING WIRE ROPE: A 32-page, illustrated brochure by E. H. Edwards Co. gives detailed information on splicing and fitting wire rope. Step-by-step photographs and drawings illustrate correct methods of splicing and fitting. For your copy circle No. 28.

INFORMATION describing the exclusive Hydro-Spring feature of the International Drott Skid-Shovel is contained in a new bulletin just released. The Hydro-Spring feature, which acts as a shock cushion, is offered in four Skid-Shovel sizes ranging from one to three cubic yards, using International tractors from TD-6 up to the TD-18 size. Circle No. 29.

LIGHTWEIGHT STOPER: A new, lightweight stoper with a faster drilling speed than heavier models is now being marketed by the Le Roi Division, Westinghouse Air Brake Company. Weighing only 79 pounds when used with a 26-inch feed, the S-10 attains its fast cutting speed through use of an end-seating valve. The stoper also features a steel puller. Circle No. 30.

NEW SIZE COMPRESSOR: The newest Jaeger Roto Air Plus Diesel unit delivers 365 cfm of air. The unit features slow speed of operation, instant-acting controls, with continuous, stepless regulation of engine speed to air demands. 100 psi minimum air pressure is maintained under all normal working conditions. Circle No. 31 for catalog and other information.

SPEED, PRECISION, and versatility are yours with the new Wild T-2 Universal Theodolite. Ten accessories, electrical illumination, and distance measuring with use of the Wild Invar Subtense Bar are designed to reduce field work to a minimum. Circle No. 32 for further information.

NEW STORAGE BATTERY: Exide Industrial Division of the Electric Storage Battery Company has recently announced a new line of flat-plate motive power batteries. Using the trade name Exide-Powerclad, they are described as premium flat-plate batteries with triple insulation. Circle No. 33 for additional information.

PEDIGREED PARTS a new booklet by Caterpillar contains the story of the engineering and research behind Caterpillar parts. Revealed are typical examples of the research and testing operations that precede the production of a Caterpillar part. Circle No. 34 for your copy.

NEW HAND TACHOMETER: A new type hand tachometer is now available for U.S. users. Manufactured by Smith Industrial Instruments Ltd., the tachometer contains many useful features insuring it a long and accurate life. The measuring system of the instrument is actuated entirely by magnetic forces which do not encounter mechanical friction. Circle No. 35 for further information on this useful device.

BIN LEVEL INDICATOR: A new type bin indicator manufactured by Convair, Pittsburgh, Pa. is available for many type applications and conditions. The indicator show high or low level of material in bins, chutes, and other storage facilities. Circle No. 36 for descriptive brochure.

DREDGE PUMP APPLICATIONS are described in a new booklet published by American Brake Shoe Company. Eleven different dredging operations in case-history form are featured, and Amsco hydraulic pump operations are described by dredge operators. Circle No. 37 for your copy.

NEW SLURRY PUMP: According to Morris Machine Works, their new type RX Pump, is easy to maintain, has a low speed, and is a continuous duty all metal pump for handling abrasive slurries. Outstanding features on this pump make it worthwhile to investigate. Circle No. 38.

LOCK-O-MATIC HUBS make 4-wheel drive more versatile. The owner of a 4-wheel drive vehicle will use these hubs oftener, for many different purposes, and will spend less on gas and repairs, if it is equipped with the new Warn Lock-o-Matic Hub, according to the manufacturer. Circle No. 39 for further information on this useful device.

50-HP MOTOR GRADER: The design, engineering, construction, and performance story of the Allis-Chalmers 50-hp Model D Motor Graders is told in the new 16-page catalog now available from the Construction Machinery Division, Allis-Chalmers Manufacturing Company. Circle No. 40 for your copy.

YOU NEED THE BEST Why settle for less is the title of a new brochure published by the Caterpillar Tractor Co. It describes the method of manufacture and selection of materials for cutting edges for motor graders. Circle No. 41 for your copy.

NEW INDUCTION MOTOR: A basically new synchronous induction motor, called the Synduction motor, for general industrial use has been announced by Allis-Chalmers Manufacturing Company. The motor is available in ratings from ¼ to 40-hp, and requires no brushes, slip rings, or windings on the rotor. Circle No. 47 for details on the new motor.

EUCLID CATALOG: The new R-15 Rear-Dump Euclid is described in a new 8-page catalog just released by Euclid Division. Rated payload of the unit is 15 tons with standard 14.00 by 24 tires, and 18 tons with optional 16.00 by 25 tires. Design, operating features, and performance data on this off-highway unit are included. Circle No. 54.

For Free Product Literature see other side

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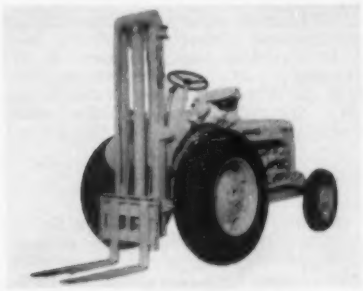
New Type Power Scraper Announced by Wooldridge

Now being delivered is the new CCS Wooldridge "Cobrette" 10-yard self-propelled scraper introducing exclusive features including fluid coupling drive, a positive power "Gear Steer" actuated by hydraulic rotary cylinders, specially designed frame and power train to permit one unit to aid in push loading another, and other design advances available for the first time in this class of equipment, according to Wooldridge Manufacturing Division, Continental Copper & Steel Industries, Inc.

Rated at 7.5 cubic yards struck, and 10 cubic yards heaped, the 143-hp Diesel powered unit has speeds up to 30 mph. Circle No. 75 for further information on this new scraper.

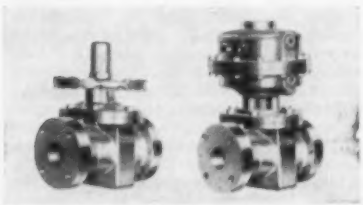


Oliver Fork Lift Loader Tractor Now Available

The Oliver Corporation is now offering the Oliver Fork Lift Loader Tractor in gasoline and full Diesel models. These new units provide ground clearance of 10¾-inches, speeds up to 14.5 mph, and lifting capacity of 4000 pounds, thus making the Oliver Fork Lift ideal for outdoor operations. Its high clearance and large diameter wheels allow this tractor to operate efficiently in mud, sand and snow as well as on rough surfaces.

Hydraulic booster steering and a six forward-two reverse speed transmission are standard features. They provide handling ease over any surface plus the proper speed for any operation.

The mast can be tilted 20° forward and 10° backward hydraulically. Circle No. 60 for further information.



Metal-Enclosed Flex Valve Seals All Movable Parts

A completely sealed, metal-enclosed flexible valve capable of operating under pressures as high as 250 psi has been developed by the Farris Flexible Valve Corp., Palisades Park, New Jersey. Called the "Superseal," the new valve incorporates a unique self-aligning drive to pinch off the sleeve body for positive tightness.

It is available with either a light hand wheel torque for manual operation or a diaphragm motor for instrument-operated automatic control in throttling, on-off, or remote control applications. "Superseal" is built with an inner valve sleeve available in a choice of rubber and synthetic materials manufactured under special, quality-control processes to insure long service life. Tests have proven, according to the manufacturer, that Flex Valves have outworn metal valves 11 to 1 in abrasive service. For complete information about the "Superseal," circle No. 77.

New ¾-yard Excavator Digs To 20 Feet

Koehring Company has announced production of a companion model excavator in the ¾-yard class that is similar in basic design to the firm's new and modern ½ and 1-yard machines. Designated as the Model 305, it has a rated lift crane capacity of 25 tons on truck chassis, 15 tons on crawler mounting and can be equipped with a full complement of attachments.

According to the manufacturer, features incorporated in the Model 305 promote ease of operation and reduce maintenance costs. The upper machinery has been simplified to contain only two major horizontal shafts. The all-welded turntable is equipped with integral sidestands, and main cross shafts revolve in anti-friction bearings. The excavator features self-cleaning crawlers, automatic traction, newly designed cab and many other features. The hoe attachment for the 305 provides an increase in digging depth to 20 feet. Circle No. 72 for further information.

Grind or Pulverize with Zero Contamination

After years of experimentation and testing, the Bico Company has introduced Ceramic grinding and pulverizing plates. These plates will pulverize your samples with almost zero contamination. Formerly, grinding with metal plates has caused contamination of the sample from plate wear. At times this causes serious problems, especially in a spectrographic analysis.

Bico Ceramic Plates are made from a high-alumina base, a material that is relatively pure and is hard and durable. Tests have shown these plates to grind approximately 1400 two-ounce rock samples, before replacement was necessary. Circle No. 80 for further information.

Notes From The Manufacturers

Fabian Bachrach photo

HENRY E. JENSEN, vice president in charge of engineering at C & D Batteries, Inc., since 1953, will now head the newly created joint post of vice president in charge of engineering and marketing. In the marketing end, he succeeds SAMUEL W. GIBB.

Ken Wernsing has been promoted from sales manager to vice president and general sales manager of the Skookum Company, Inc. Phil A. D. Hobbs, president, announced the change.

A. B. Drastrup has been appointed vice president of the Joy Manufacturing Company, with headquarters at Joy's executive offices in Pittsburgh, Pennsylvania. Mr. Drastrup formerly was president of the A. M. Byers Company.

Foote Mineral Company now has lithium metal available in commercial quantities from its new metal cell in Exton, Pennsylvania. The metal is offered in one pound ingots packed under oil in sealed steel cans and analyzes 99.8 percent Li.

Charles L. Holbert is the new executive vice president of H. K. Porter Company, Inc. Mr. Holbert, who will be operating head of Porter, succeeds Clarence R. Dobson who has retired.

R. D. Longyear, president, and Eugene Larson, sales manager, of E. J. Longyear Company, are in Europe to attend trade fairs at Milan, Italy; Hannover, Germany; and Birmingham, England. The company is exhibiting its core drills and equipment at the International Trade Fair in Milan, and the German Industries Fair in Hannover.

Atlas Powder Company recently announced that Albert W. Strahorn, former assistant chief engineer, has become director of explosives production. Henry T. Clark is now planning assistant to D. J. C. Copps, vice president in charge of explosives. Lewis T. Marks, Jr. has taken over Mr. Clark's former duties as head of the chemical control section.

WILLIAM B. STEPHENSON (right) has been elected president of the Allen-Sherman-Hoff Pump Company, succeeding HOMER E. ALLEN, who will serve as chairman of the board of directors. Formerly vice president of the company, Mr. Stephenson is well known in mining fields as an authority on the pumping of abrasives and corrosives. He has been identified with A-S-H pumps since 1933. FRED S. STOW will take over the duties of vice president as well as continuing his present work as chief engineer.

Personalities

Continued from page 72

unit of the American Smelting and Refining Company working out of the Tucson, Arizona office.

D. E. Kivett of Salt Lake City is the new president of Utaco Uranium, Inc. Mr. Kivett, formerly vice president, succeeds **George Burck**, of Moab, Utah, as president. **Bill Hines** of Moab was re-elected secretary-treasurer. New directors are **Everett Blackburn**, Utaco's superintendent of mining operations; **Michael J. Shestric** of St. Louis, Missouri; and **John F. Spalding** of Jefferson City, Missouri.

Harry B. Young, U.S. Atomic Energy Commission geologist, has been transferred from Buffalo, South Dakota, to Dickinson, North Dakota, as district geologist. He replaces **Robert Curtiss** who is now at the AEC suboffice at Rapid City. **William Weaver** will replace Mr. Young at Buffalo.

Clayton A. Landsidle has been promoted to the position of executive vice president of Manu-Mine Research and Development Company, Reading, Pennsylvania. Mr. Landsidle, who had been general manager of the company since 1954, started with Manu-Mine in 1953 as chief project engineer. The announcement of his promotion was made by **Charles W. Stickler, Jr.**, company president.

Dr. J. Wilfred Patterson, nationally known metallurgist and expert on chrome and titanium production, is now associated with United Western Minerals. **Patrick J. Hurley**, chairman of the board, and **Alva A. Simpson, Jr.**, president and general manager, announced Dr. Patterson's addition to the company as part of their current program of expansion.

F. E. Ball, of Kennecott Copper Corporation's Nevada Mines division, was recently named assistant construction superintendent. **Asay B. Johnson** is the new chief engineer of the power plant. Both men previously worked at the company's McGill plant; Mr. Ball as construction engineer and Mr. Johnson as power plant general foreman.

J. W. Trelour, chief chemist at the Iron Mountain mine in Missouri, has retired after 45 years with the M. A. Hanna Company. **Richard L. Key** was promoted from assistant chemist to replace Mr. Trelour.

Percy H. Ramsden has resigned his position as superintendent of the Pennington mine for Rhude & Fryberger, Hibbing, Minnesota. Mr. Ramsden has formed a new company, the Minnesota Mining & Developing Company, to explore for uranium and develop leases now held in the Colorado Plateau area.

A. J. Thompson was elected chairman of the Central New Mexico section of AIME at a recent meeting in Albuquerque. Other new officers are: **J. B. Knaebel**, vice chairman; **E. P. Chapman, Jr.**, secretary-treasurer; **John A. Wood** and **T. O. Evans**, members of executive committee. Mr. Evans is also delegate for the group.

Obituaries

Henning E. Olund, 71, died in Santa Monica, California recently. A mining engineer, Mr. Olund retired in 1954 after serving nine years with the U. S. Government Minerals Division and the U. S. Bureau of Mines. Early in his career, he formed the Radior Company. He was vice president and director of this geologic company which operated in Canada, the United States, Mexico, and Russia.

Compton I. White, 78, former Idaho congressional representative and mine owner, died April 5 in Spokane, Washington. He managed the Whitedelf Mining and Development Company for many years and owned the Clarinda mine on Pend Oreille Lake, Idaho. Elected to Congress in 1932, Mr. White served for 14 consecutive years. He was again chosen as a representative in 1948 and served until 1950. In Congress he was a strong proponent of silver currency and introduced a resolution in 1933 calling for bimetallism.

Ronald C. Rowe, 66, mining engineer and editor of the "Canadian Mining Journal" died in Senneville, Quebec, on March 27. During his early career as a mining engineer, Mr. Rowe managed the Consolidated Graphite Company and the Crucible Graphite Company, and was general manager of the North American Graphite Company. He joined the staff of "Canadian Mining Journal" in 1927 as associate editor and became editor in 1928. He helped to form National Business Publications Ltd. and was president at the time of his death.

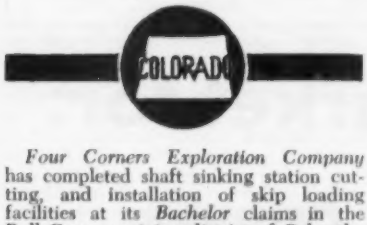
Corwin L. Cooper, 65, vice president of Knob Hill Mines, Inc., died recently in San Francisco. He had been with the firm since 1936.

American Gilsonite's $16,000,000 Project

American Gilsonite Company has embarked upon a $16,000,000 expansion program which will include construction of a $12,000,000 processing plant at Fruita, Colorado, sinking of new mine shafts at Bonanza, Utah, and laying of an 80-mile pipeline between Bonanza and Fruita.

The plant will convert gilsonite mined at Bonanza to high octane gasoline and metallurgical grade coke. It is scheduled for operation tentatively around May 1, 1957. Construction of the refinery has been contracted to four firms. Kaiser Engineers of Oakland, California will design and erect the calcining plant, utilities, and auxiliary facilities; Foster Wheeler Corporation of New York will construct a delayed coking plant; H. K. Ferguson Company of Cleveland, Ohio will build the catalytic reformer and hydrogen plant; and Petrocarb Equipment Inc. of New York will handle the consulting engineering concerned with the calcining operations.

At the mines, the company has completed a four-compartment shaft to a depth of more than 800 feet on the Cowboy vein, and has completed another shaft on the Bonanza vein. Drifting has started on both veins with the use of a water-jet piercing machine.



Four Corners Exploration Company has completed shaft sinking station cutting, and installation of skip loading facilities at its *Bachelor* claims in the Bull Canyon mining district of Colorado. Mining operations should get underway shortly. With Bill Buchecker supervising, the two three-man crews averaged three feet per eight-hour shift in the five-foot by nine-foot shaft. Dewey Baker and Charles (Chubby) Frein hold mucking honors with 39 1,500-pound buckets hand loaded in one shift. Other shaft men were Harold Nelson, Dale Palmer, Bob Blair, and Carl Evans, Harold Berndt handled equipment and supplies. Four Corners Exploration is a partnership of Irving Rapaport and F. O. Manol. It recently moved its principal offices from Grants, New Mexico to the Petroleum Building in Grand Junction, Colorado.

Golden Cycle Corporation of Colorado Springs, Colorado produced 6,840 tons of uranium ore in 1955 valued at $241,900, compared with 3,846 tons in 1954 valued at $136,025. According to the firm, it was necessary to hoist 10,580 tons of waste rock in order to mine the 6,840 tons, or 1.55 tons of waste for every ton of ore. This, of course, increased mining costs and cut down on production. Last year the company also produced 25,364 tons of gold ore worth $42.86 per ton, or $1,087,226, from its *Ajax* mine, the only gold property it operated last year. 1954 gold production was 26,807 tons worth $39 per ton, or $1,045,344.

Moab Uranium Company reports that it has purchased a site for a base metal mill close to its properties near Lake City, Colorado. The company is now negotiating for a mill. Last winter the firm acquired three mines near Lake City—the *Detroit* and *Gnome* lead-zinc mines, and the *Golden Wonder* gold property. An option on the Gnome has been sold to W. D. Kennard, a Texas oil man. The company is also a part owner of the *Matchless* uranium property in Mineral Canyon, together with *Sovereign Uranium Gas & Oil Company*.

Charles E. Curry of Kansas City, Missouri has exercised his option to purchase the common stock of the *Shenandoah-Dives Mining Company* of Silverton, Colorado. The firm has been closed since 1954. With control of the stock now in the hands of one party, it is hoped that some arrangement will be made with some company to either purchase the mine and mill or lease it.

Seaboard Oil & Gas Company of Wichita Falls, Texas has opened new offices in Denver, Colorado to handle the company's recently acquired 22,000 acres of uranium mining properties in Colorado, New Mexico, Utah, and Wyoming. The *Equitable Uranium Corporation* of Colorado and the *Socorro Uranium Corporation* of New Mexico were recently annexed by Seaboard as wholly owned subsidiaries. Ray A. Bennett, vice president in charge of mining operations, will head the Denver offices and is supervising the initial core drilling and exploration on the *J. V. Eavenson Lease* in the Dove Creek area of Colorado. Mr. Bennett has also contracted with the *C. C. Starnes Company* of Grand Junction for mining of Seaboard's *Jeter* properties in the Ladrone district of Socorro County, New Mexico.

The *Texas-Adams Oil Company, Inc.* of Denver and New York has acquired the surface sulphur deposit owned by the *United States Sulphur Company* near Dunton, Colorado. The ore is composed of 30 percent sulphur, and, after crushing, is sold as a soil additive. The orebody is estimated at 500,000 tons. Present production is about 50 to 60 tons daily; this is expected to be increased to between 200 and 300 tons daily by the new operators.

Climax Molybdenum Company at Climax, Colorado is experimenting with a method of increasing recovery of tungsten from Climax ore. The work is under the direction of the mill department with Bill Gregory, mill metallurgist, in charge. Nearly 29,000 tons of tailing are fed daily to the byproducts plant which recovers tungsten, tin, and iron pyrite from the coarse ground ore by gravity, flotation, and magnetic separation. About 13,000 tons of fines are sent to the tailings pond from the byproduct plant without treatment because a practical method has not been devised to recover this very fine tungsten. About 2,800 pounds of tungsten concentrate are presently recovered from the 16,000 tons of ore handled by the byproducts plant. The fine tailing contains nearly as much tungsten as the coarse so that a suitable recovery could almost double recovery of the metal. The present experiment is being conducted only on day shift handling about 30 tons per day of the fine tailing. The test utilizes a portion of the overflow from the Dorrclones in the byproduct circuit.

Uranium Reduction Company is adding an alkaline leach system to its new mill now under construction near Moab, Utah. This will enable the mill to purchase or custom treat ores either on basis of a lime penalty with vanadium payment or no lime penalty without vanadium penalty. The addition is expected to be completed during the first half of 1957. The plant itself should open later this summer. Uranium Reduction and *Standard Uranium Corporation* have been exploring the Big Indian properties they hold jointly. Drilling operations have blocked out 109,296 tons to date on the *Mamie* claim, but no ore has been found on the other six Big Indian claims to date.

San Francisco Chemical Company has completed its 2,300-foot adit at the *Cherokee* phosphate mine in Rich County, Utah. Following this, a 1,000-foot drift to the west and a 2,100-foot drift to the east were driven along the ore body. Presently a raise is being driven on a 25 percent slope. Mining of the ore is scheduled to start soon. The adjacent *Arickeree* mine is now in full production. Both are underground operations.

Atomic Resources, Inc. of Albuquerque, New Mexico will undertake construction of a uranium ore upgrading mill on the *Waterfall* group of claims in the Dry Valley area of San Juan County, Utah. The mill processes 100 tons of ore per day, according to "Petroleum Information," and will include a vanadium black cake unit and a uranium yellow cake unit. Exploration by the firm has blocked out 25,000 tons of ore averaging 0.25 percent uranium and 1.5 percent vanadium on the *Gilman* claim of the group. Mining is by open pit. The Waterfall group is owned by *Molybdenum Corporation of America*, a major stockholder in Atomic Resources. The claims were leased by Molybdenum Corporation to *Santa Fe Wester Gas & Uranium*, which in turn, contracted with Atomic Resources for exploration, mill construction, and development. Mining is under contract to *J&R Construction Company* of Salida, Colorado.

A larger air compressor and other equipment have been acquired for the start of production at the *Mernab* uranium project on Deadhorse point near Moab, Utah. Ore is to be mined from a development tunnel and shipped to the Monticello buying station. Mernab is a joint operation of *Merger Mines Corporation, Nabob Silver-Lead Company*, and *Bismarck Mining Company*, north Idaho firms.

The *Ransom* uranium mine near Blanding, Utah is yielding about 1,500 tons of ore monthly and providing $7,500 monthly to owners of a 20 percent royalty. The royalty was purchased recently by five north Idaho firms, *Sunshine Mining Company, Sunshine Consolidated Mining Company, Silver Syndicate, Inc., Clayton Silver Mines*, and *Uranium Discovery and Development Company*.

Monthly production of halloysite clay has been increased from 6,300 tons to 6,400 tons at *Filtrol Corporation's* prop-

Before and After Applying MANGA-TONE N.M. and RESISTO-LOY

This rebuilding job on Gyratory Liners was accomplished economically despite the fact that well over an inch of deposited metal was required all around the bottom third. Note the very badly worn areas in the "before" picture. Then note the perfectly done, finished job.

This rebuilding was done by the plant maintenance welder, using our Manga-tone N.M. to rebuild the liner and making the last pass over the lower 15 inches with Resisto-Loy. This final coating pays a fine dividend in additional wear resistance.

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erty in the Eureka district of Utah. Most of this is from underground operations. However, the firm expects to resume open-pit work later this year. The property is leased, with an option to buy, from the *Dragon Consolidated Mining Company*.

American Zinc, Lead and Smelting Company, St. Louis, Missouri, has established western headquarters in Salt Lake City, Utah. The office will oversee all western operating and exploration activities. R. E. Calhoun will manage the office, and H. F. Mills, chief western geologist, will make his headquarters at the new branch. American Zinc has mining and prospecting operations in Washington, Colorado, Utah, Nevada, and Arizona.

The *Uranium Ore Haulers Association, Inc.* has been organized in southern Utah. Glen Victor has been elected president and chairman of the board. The group has gone on record as opposing the hauling of ore by unauthorized carriers.

WYOMING

Under terms of its agreement with *Mile High Minerals, Inc.* of Denver, Colo., *Phelps Dodge Corporation* has started full-scale testing work on the *Trey* uranium claims in the Crooks Gap area of central Wyoming. Phelps Dodge now has a crew of more than 30 men and three drilling rigs at work, with at least one more drill scheduled to go to work within a short time. A large camp of 10 field trailers, complete with kitchen, dining room, laundry and showers, has been set up; a domestic water well has been drilled.

Carl Lough, president of *Loma Uranium Company* of Denver, Colorado has announced that his firm will do more than 100,000 feet of test drilling, mostly in the Crooks Gap area of central Wyoming, on its uranium properties. He also announced that the firm has blocked out a major uranium ore body on part of its Crooks Gap holdings.

Bids are slated to be called shortly by the Bureau of Public Roads for construction this summer of slightly more than 50 miles of a uranium access road from near Riverton to the Gas Hills area of central Wyoming.

A record blast for Gas Hills uranium mining operations was set off late in April when *Vitro Minerals Corporation*, leading producer in the area, detonated 34,000 pounds of dynamite for removal of overburden and ore.

The District Court, meeting in Lander, Wyoming, has refused to re-open a claim mining suit for admission of new evidence, as requested by *Globe Mining Company* of Casper in its suit against three prospectors. Globe Mining, loser in a decision given by the court in February, said that the AEC had done some test drilling on its claims, prior to location of claims by the three prospectors, and claimed that subsequent discovery of uranium mineralization in the drill holes constituted a valid discovery for the plaintiff. In effect, the court ruled that the drilling by the AEC was not applicable. Earlier, the court had ruled that Globe Mining did not have legal claims in the area under contention and that the prospectors were legally entitled to enter and make mineral locations.

Two States Uranium Corporation has announced that drilling has blocked out an ore body estimated to contain 250,000 tons in the Gas Hills area of Wyoming. A large pit has been excavated and mining is now underway on a body of ore averaging more than 50 feet in thickness.

According to Congressional representatives from Wyoming, the AEC is now considering the possibility of two uranium processing mills in Fremont County, where only one had previously been considered. Following a re-survey of ore reserves in the county, for which tonnages are constantly increasing, the AEC's Grand Junction operations office forwarded a report to Washington, D.C., indicating the possibility of two mills, one in the Gas Hills and the other in the Crooks Gap area.

Lost Creek Oil & Uranium of Rawlins, Wyoming has resubmitted its proposition to the U.S. Atomic Energy Commission for construction of a uranium processing mill in central Wyoming, changing its location from Riverton to a site along the Sweetwater River. The location would be approximately half way between the Gas Hills and Crooks Gap uranium fields and would provide ample water.

Battle Mountain Copper Optioned To Dallas Firms

General Minerals Corporation and Continental Sulphur & Phosphate Corporation have acquired a six-month option to purchase mining properties and physical assets of Battle Mountain Copper Company at Battle Mountain, Nevada. Included are a 500-ton-per-day sulphide flotation mill and approximately 10 square miles of mineral deposits in Copper Basin and Copper Canyon, Nevada.

Production of copper-gold-silver concentrate will continue during the option period with General Minerals operating on behalf of the joint venture. Sulphide production will be increased to full mill capacity. Concentrates is presently being marketed by the joint venture through the American Smelting & Refining Company at Tacoma, Washington, with profits accruing to the joint venture. Estimated proven reserves in the properties include sulphide ore assaying 1.5 percent copper, and non-sulphides—oxide, silicate, and carbonate—averaging 1.5 to 2.0 percent copper.

Techmanix, Inc., of Salt Lake City has been awarded an engineering contract for metallurgical and flowsheet determination in connection with a proposed 500-ton leaching circuit to process oxide, silicate, and carbonate ores. If the option is exercised, construction of the additional mill facilities will start immediately thereafter and require approximately 90 days for completion.

Production has been resumed at the *Antlers* copper-zinc mine, near Yucca, Arizona, according to R. J. Dalton, manager. The new operator is *Samicol Mineral Corporation* of Santa Fe, New Mexico, working under a lease and option agreement with *Yucca Mining and Milling Company*. The mine superintendent is Mac Dye, formerly of Grand Junction, Colorado; mill superintendent is Rip V. Thompson, formerly of Henderson, Nevada. Meanwhile, Mr. Dalton and his sons are continuing their fertilizer operations at the Antlers property. This fertilizer and soil conditioner, known commercially as Ferro-Soil-Til, is a by-product of the flotation operation and is marketed throughout the West.

Miami Copper Company, Miami, Arizona, reports that following the detailed examination of uranium claims previously located in the Sierra Ancha region of Gila County, all but 1,000 acres with the most favorable showings have been dropped. Underground exploration and prospect drilling, the company said, determined the existence of material meeting shipping requirements of the U. S. Atomic Energy Commission and a small amount of shipping ore has been stockpiled. Activities, however, have been suspended awaiting the building of an access road by other agencies, and a drilling program by the AEC.

During the first quarter of 1956, the *San Manuel Copper Corporation*, San Manuel, Arizona, produced 13,524,000 pounds of copper. Production from the San Manuel mine was started January 8, 1956, and full production from the mine, at the rate of about 30,000 tons of ore a day, is expected to be reached by mid-year. F. H. Buchella is general manager at San Manuel; C. L. Pillar, mine superintendent.

The *Banner Mining Company* of Tucson, Arizona, has reported that the program of increased exploration work, including geophysical surveys, diamond drilling et al, is bearing good results in that new copper horizons have been located. General manager A. B. Bowman also commented that plans are being prepared for doubling the size of the Mineral Hill mill to bring capacity to more than 900 tons of ore daily. The year of 1955 was the first full year of production from Banner's mines in Arizona.

Atomic Ores, Inc. has been granted a 10-year lease to prospect for asbestos in northern Gila County, Arizona, by the White Mountain Apache Tribe. The area covered by the lease is 207 acres located at the junction of Salt Draw Creek and Salt River. Grady B. Gulledge of Globe, Arizona, is president of Atomic Ores.

A carload of copper ore was shipped recently by the *Pittsburgh* mine, near Ruby, Arizona, to the *American Smelting and Refining Company's* smelter at El Paso, Texas. The mine is being developed by Louis Sioretta of Nogales and associates. The Pittsburgh is a part of the old *Warsaw* group and its history dates back to the 1870's. It was operated briefly during World War II.

The *Shattuck Denn Mining Corporation* reports that a laboratory is being installed at the *Iron King* mine near Humboldt, Arizona, where engineers and metallurgists will conduct research work designed to increase recoveries of metals and effect other improvements in metallurgical processing of the Iron King and other ores in which the company may be interested. Last year, the mine produced 222,892 tons of ore, as compared with 179,484 tons in 1954. The ore came largely from the 12, 13, 14, and 15 levels. Development work continued on the 15 and 17 levels, and further work was done in and around the new No. 7 shaft which has now been sunk to a depth of 1,940 feet.

About 20 men are being employed in exploratory work in the Twin Buttes area south of Tucson, Arizona, by the *Duval Sulphur and Potash Company* of Texas and New Mexico. Major property in the group under study is in the vicinity of the *New Year's Eve* mine where investigations have been in progress for several months. B. G. Messer of Tucson, Arizona, engineer for Duval, is in charge of the work.

Shipments of copper ore are being trucked to the *New Cornelia Branch, Phelps Dodge Corporation*, Ajo, Arizona, from the old *Papago Chief* group of claims. The property is located in the Baboquivari Mountains, near Arivaca. Operators are Barney Mears, Ernest O'Dell, and Frank Dworek, all of Tucson.

Miami Copper Company, Miami, Arizona, has announced plans to replace its old precipitation plant with a modern one to be constructed west of the company's power house. The new plant will consist of launders, sumps, pumps, and a new drying floor for the cement copper. Since 1942, Miami has been acid leaching the residues overlying the previously mined areas, then precipitating the copper with iron. About 15 percent of Miami's aggregate production during this period has been obtained from this procedure.

Major Expansion Underway at Ray

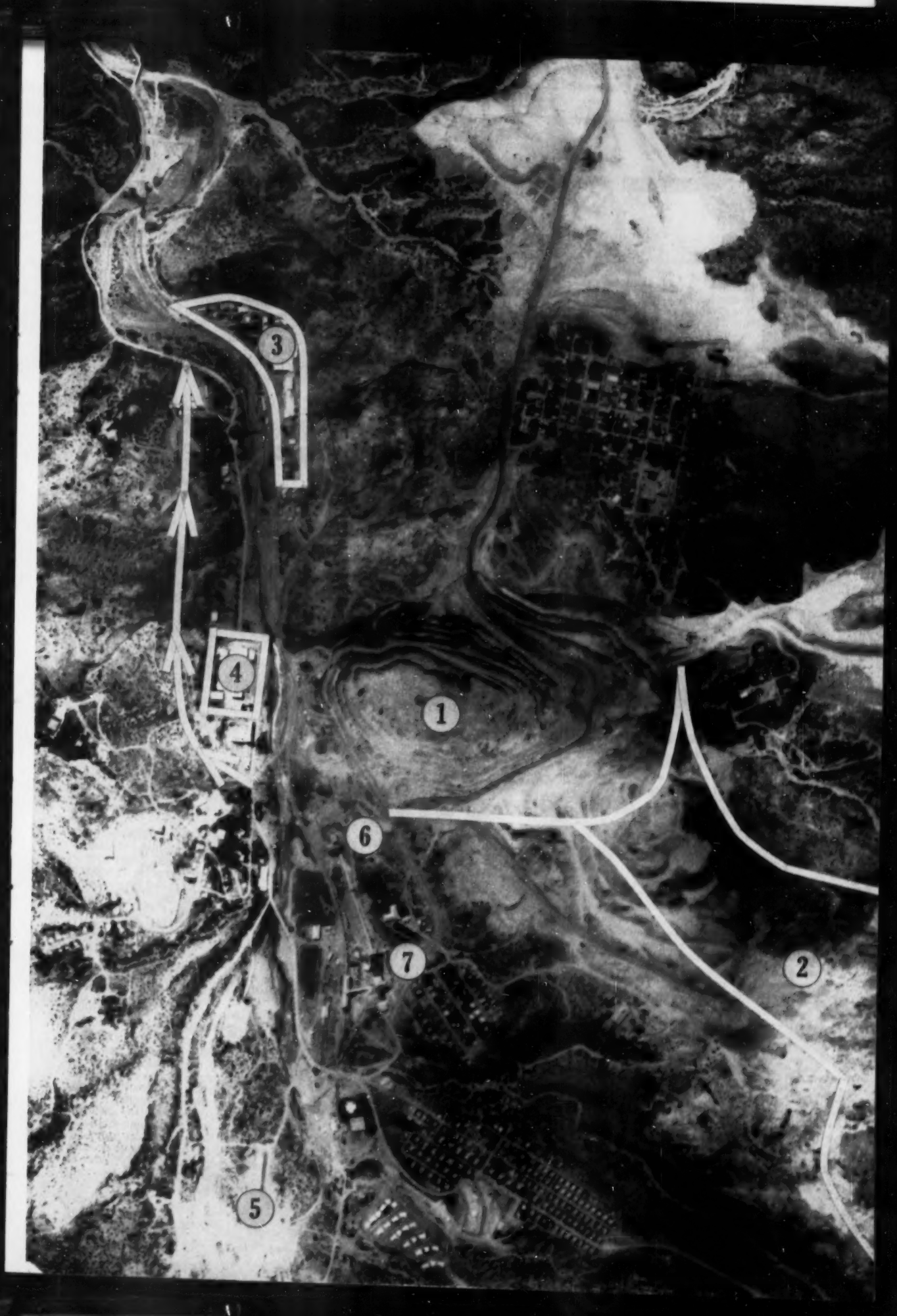
Plans for a $40,000,000 construction and expansion program have been announced for the Ray Mines Division of Kennecott Copper Corporation at Ray, Arizona. Major items in the program are erection of a smelter at Hayden, and the extension of the open-pit mine at Ray. This is expected to result in a 20,000-ton increase in the division's annual copper output by 1958. In 1955, the division mined and milled 4,818,358 tons of ore and produced 48,983 tons of copper.

Under the new plan, the present mining limits of the Pearl Handle pit will be extended and deepened (see No. 1 in aerial photograph at right) and the new West pit (No. 2) will be developed within the limits of the boundaries shown by white line. In the process, diversion of the stream along one edge of the pit will be necessary. (Broken arrows indicate the new creek bed.) Many surface installations built years ago to serve the underground mining operation must be moved. Shops at No. 3 and buildings at No. 4 will be moved to the new shop area to be built at No. 5. The primary crushing plant is at No. 6. It is connected to the secondary crushing plant, No. 7, by a 522-foot conveyor.

Conversion of the Ray mines to an open-pit operation started in 1948 and was completed toward the end of 1954. All underground mining was terminated on January 28, 1955.

Last fall, Kennecott contracted for the construction of a $5,000,000 leach-precipitation-flotation plant at its Hayden concentrator which, it is estimated, will increase the copper recovery from the refractory Ray ores by 12 percent. The plant is scheduled for completion in February 1957.

Construction of the smelter will permit Kennecott's Ray Mines Division to handle its own output, which, heretofore, has been done on a toll contract basis by the Hayden smelter of American Smelting and Refining Company. A. P. Morris is general manager of Kennecott's Ray division.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CALIFORNIA

Daybreak Uranium, Inc. of Opportunity, Washington has shipped two cars of high-grade copper ore reclaimed from old dumps at the *Calaveras* mine, Copperopolis, California. A bulldozer equipped with hydraulic bucket loader is being used. The company is stockpiling copper cement from leaching of mine waters pumped from old underground workings.

The *Verdi Development Company* has shut down its uranium mill operations at Soledad Mountain near Mojave, California, which went into production last November. During the initial phase of mill operation, the grade of sodium uranate produced was 15 percent; by January of this year, the grade had improved to 50 percent, but the operators were not able to economically upgrade the concentrate to the minimum of 70 percent necessary to obtain an AEC contract. The mill was built to process ore from the firm's 2,200-acre claims at Rosamond.

Natomas Company officials, in a move toward diversification, have approved a stock merger with *American President Lines Associates*, holding company for the *American President Lines*. This will give Natomas 46.7 percent of the common stock equity in APL. Natomas, in turn, will issue 2,329,636 of its shares to APL Associates for that company's assets.

Shattuck Denn Mining Corporation has sold part of its *Scales* property in northern Sierra County, California. According to the company, that part sold was composed of patented mining claims; however, the mineral rights and certain water rights were retained.

Manu-Mine Research and Development Company of Reading, Pennsylvania will open a western division office in San Francisco for geological engineering and soil stabilization. The office will be headed by Chester E. Wood, former deputy chief engineer of the city of Vallejo, California, who is a graduate mining engineer.

NEVADA

Apex Uranium Mines Inc. of Reno, Nevada has filed a letter of intent to build a uranium mill capable of processing from 100 to 150 tons a day. The company reports it has struck a new primary ore body. Recently, it also purchased seven copper claims of 20 acres each and plans open-pit mining. Some carload shipments will be sent to *Kennecott Copper Corporation's* smelter at McGill, Nevada for sampling purposes.

Manganese, Inc. at Henderson, Nevada will install larger motors on existing cells in its mill and also add 20 new conditioning tanks outside of the mill in attempt to improve recovery from its *Three Kids* manganese ore. When this installation has been completed, the pulp will be pumped from the classifiers through the new conditioners and then through the existing conditioning cells. The extra units are expected to improve the high designed output of the plant which treats 1,200 long dry tons of ore every 24 hours.

Simplot Silica Products Inc. has been exploring its silica deposit at Overton, Nevada, and is also drilling and evaluating the *Whipple* gypsum property which was recently acquired by the company. Slim Robinson and Joe Jemmett have been in charge of the operation. Simplot Silica Products is a subsidiary of the *J. R. Simplot Company* of Boise, Idaho.

Basic Refractories Inc. of Gabbs, Nevada has submitted to its stockholders a proposal to change its name to *Basic Incorporated*. Reason given is that the company has expanded, plans further expansion, and diversification in the nonmetallic field.

Standard Copper Company has been diamond drilling the *Davis Canyon* copper property which it has lease-optioned from E. B. and Clara Crane. The property is in the northern region of the Diamond Range. The company also has other holdings in the Diamond Range facing Newark Valley. It plans to do development on both properties as soon as the weather permits. Martin Nestler is president of the company, and his wife, Flossie, is secretary-treasurer.

NEW MEXICO

Standard Uranium Corporation has entered into a joint venture with *Col-U-Mex Uranium Corporation* in the Ambrosia Lake district near Grants, New Mexico. Under terms of the agreement, Standard will carry out and bear costs for initial drilling and exploration activities on 77 claims covering about 2,000 acres. On commencement of mining operations, Standard will receive two-thirds of all mining profits with the balance going to Col-U-Mex. Mining costs will be shared on the same basis. The venture will be operated under the name of *Stan-Col Uranium*, and will be under the direction of Standard's management.

The *American Metal Company Ltd.* has signed an agreement with *Sabre Uranium Corporation* and *Pinon Uranium Company Inc.* whereby Sabre will acquire all of the assets of Pinon in exchange for Sabre common stock, and then American Metal will invest $4,500,000 in the resulting company; that is, $2,000,000 for 25 percent of the common stock and $2,500,000 for preferred stock. American Metal will also act as manager of Sabre in development of its uranium properties in McKinley County, New Mexico and will build milling facilities in the Grants area if the AEC grants a purchase contract. Approval of stockholders is necessary before final completion of the arrangement.

Melvin E. Richards, president of *Yucca Uranium Company* has announced that stripping operations have started on *Yucca No. 2* in McKinley County, New Mexico and that the company has farmed out a drilling program for *Yucca No. 1* in Valencia County. *White Horse Uranium Company* has taken an option on one-half undivided interest in 92 claims held by Yucca in Valencia County.

Holly Uranium Company has started production from its *Beacon Hill* mine in McKinley County, New Mexico on property adjoining the *Mesa Top* mine. First shipments have been made, according to Holly's president, A. H. McRae. Holly is also operating the Flat Top mine, but has leased its *Lucky Don* in Socorro County to the *Three Bears Mining Company* on a royalty basis. Holly also operates a mercury mine in Idaho, a fiber mine in Arizona, and a copper mine in Mexico. Acording to Mr. McRae, about 30 percent of the company's revenue comes from uranium.

W. Stewart Boyle, president of *Texas National Petroleum Company*, of Houston, Texas, which has entered into a long-term mineral, oil, and gas lease in the Jemez Mountains with *New Mexico Timber Company*, said uranium mining operations are expected to start this summer. Some deposits were located in previous prospecting, he said. Also that some experimental mining will be done in the Burnett copper mine in the area, where surveys have shown that it can now be operated at a profit, with new techniques. It was closed in 1947. Texas National is successor to the *L-F Oil Company* which formerly held a prospecting permit on the acreage. L-F merged with the *Johnston Oil and Gas Company* to form Texas National.

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During the March 1956 quarter, *White Pine Copper Company*, a subsidiary of the *Copper Range Company*, produced 18,500,000 pounds of copper, or at an annual rate of 74,000,000 pounds, at its Michigan operation. The smelter only went into production toward the end of 1953 and by year's end had produced 35,451,229 pounds of refined copper. With the steady increase, it now appears that the company might produce as much as 80,000,000 pounds annually, rather than the original 75,000,000-pound rate. Copper Range owns about 260,000 acres of land in northern Michigan; the mineral acreage at White Pine is about 15,000 to 17,000.

A new firm in the Platteville, Wisconsin area is *Roland F. Beers, Inc.* which is exploring for lead-zinc orebodies using airborne electromagnetic methods. Helicopters equipped with recording equipment fly over the exploration area on some predesignated grid or pattern. If a probable sulphide body is indicated, this will be examined on the ground by extensive drilling. George Sullivan, former mill superintendent for *Calumet & Hecla*, is the new firm's chief agent in Platteville.

The superintendent of the Minnesota Agency for the Bureau of Indian Affairs at Bemidji recently called for bids on 21 different units of Chippewa Indian property in the northwest angle of Minnesota for uranium prospecting. About 9,920 acres were involved. Prospecting permits to be issued will carry the right to lease specific portions, or perhaps all, of each area, within one year, for uranium mining. Mining leases granted in connection with the prospecting permits will be for a period of 10 years, and as much longer thereafter as uranium is produced in paying quantities. A percentage royalty schedule has been worked out.

Calumet & Hecla, Inc. expects one shaft at its *Osceola Lode* project in Michigan to be producing about 1,500 tons of copper ore daily by the middle of the summer. Another shaft, with about the same production, is expected to be in operation by fall.

William G. Reynolds has been granted a $5,620 DMEA loan to explore for thorium, uranium, and rare earths in Hardin County, Illinois. The government's share in the project is $4,215.

Woodward Iron Company has purchased the *Muscoda Division* iron ore mines from the *Tennessee Coal & Iron Division* of the *United States Steel Corporation* for an undisclosed price. The mines have been closed for some months, following TC&I's conversion to richer ores from the *Cerro Bolivar* mines in Venezuela, operated by *Orinoco Mining Company*, another U. S. Steel subsidiary. Woodward plans to begin work on reopening the Muscoda mines immediately. They adjoin Woodward's *Pyne* ore mine, separated only by a barrier pillar which will be removed so that ore can be taken out through shafts in either section. Woodward also purchased from TC&I the *No. 5* limestone mine and equipment, together with railroad trackage serving the Muscoda mines which will be connected with Woodward's tracks.

Kennecott Copper Corporation has decided to exercise its option to buy about 120 acres of land at Tonawanda, New York. The company's plans for the property still have not been revealed, but rumors are that Kennecott is considering construction of a titanium metal producing plant. A subsidiary, *Kennecott Titanium Development Corporation*, has an experimental titanium metal plant at the *Battelle Memorial Institute* at Columbia, Ohio, and Kennecott also owns two-thirds of *Quebec Iron & Titanium Company*.

The old *Ringwood* iron mines at Ringwood, New Jersey, which have been producing ore since Revolutionary times, were taken over by the *General Services Administration* last December and are now on a care-and-maintenance basis. The mines were most recently held by *Ringwood Iron Mines Corporation* which purchased them from the U. S. Defense Plant Corporation. In 1954, they were finally shut down when officials said they could no longer compete with open-pit mines in the mid-west and South America. Last December the GSA took over the mines when the corporation defaulted on a $1,400,000 government-held mortgage.

The nation's largest and newest titanium reduction plant has produced its first heat of titanium metal sponge at Ashtabula, Ohio. This is the first commercial production of titanium sponge in the United States by a method other than the magnesium-reduction process. In this new operation, *Electro Metallurgical Company*, a division of *Union Carbide & Carbon Corporation*, uses sodium to reduce titanium tetrachloride. When in full operation by the end of this year, the plant is expected to produce about 7,500 tons of titanium metal sponge annually.

General Electric Company reports it is producing industrial diamonds on a pilot plant basis, and that synthetic industrial diamonds could develop into a $200,000,000-a-year business over the next 10 years. The *Carboloy Division* of the firm has been working on the project for some time.

A new plant has been put into operation on a 3,000-acre site in southwest Georgia to mine and process Fuller's Earth. Located at Quality, Georgia, about four miles from Meigs, the plant is owned by *Waverly Petroleum Products Company* of Philadelphia.

Difficulties in obtaining electrical equipment have delayed plans for opening *American Zinc Company of Tennessee's* new Coy shaft near Jefferson City, Tennessee until the last quarter of this year. The company reports that it recently located a valuable zinc ore body at the Mascot property and that exploration work is under way.

U.S. Steel Corporation will install a new car dumper and ore handling equipment at its Ohio Works blast furnace department as another step in the firm's multi-million dollar expansion program. The dumper will operate in conjunction with a new iron ore sintering plant announced recently. The handling facilities will include a 3,500-ton bin and a 2,000-foot rubber conveyor belt which will transport ore from the bin to any part of the 1,500,000-ton storage yard or to the sintering plant.

Phelps Dodge Corporation is reported to have purchased as an investment 95,000 shares of *New Jersey Zinc Company* common stock for an undisclosed price from *St. Joseph Lead Company*. St. Joe Lead, in turn, says it will use the proceeds of the sale for its zinc smelting expansion program at Josephtown, Pennsylvania.

A new washing plant will be built at the *Webb* iron ore mine at Hibbing, Minnesota by the *Snyder Mining Company*. The plant will have a capacity for treating 200 tons of wash-grade ore per hour and will be of conventional design, using log washers, screens, and classifiers. The ore will be trucked from the open-pit to the plant; rail facilities will also be provided at the plant for bringing in any custom shipments.

Iron ore shipments on the Great Lakes are off to an excellent start with tonnages running well ahead of last year at this time. First month's shipments (April) in 1956 totaled 5,601,486 tons, compared with 3,678,045 tons. (Last year's opening date was later than this year, but April shipping in 1956 was disrupted frequently by bad weather.) As of May 9, 8,133,928 tons had been moved, or 40 percent more than this time a year ago when the cumulative total was 5,793,471.

The first taconite shipping season for Minnesota started this year with the shipment of 10,800 tons of taconite iron ore pellets from the *Reserve Mining Company's* E. W. Davis Works at Silver Bay. The company expects to load a boat and a half daily during the season. The first shipments were part of the 1,000,000-ton stockpile. Reserve expects to produce 3,750,000 tons of pellets annually.

Since first ore was hoisted at the *Cannon* mine of the *M. A. Hanna Company* in Michigan, March 23, 1953, underground development work has proceeded at an accelerated rate. For the period from April 1, 1955 to March 31, 1956, 9,800 feet of drifting were completed; 1,200 feet of scraper drifting; 6,900 feet of sub level drifting; and 4,300 feet of raising. Transportation of the ore from the stopes is by 11-ton electric locomotives which pull eight or ten 120-cubic-foot cars. At the shaft station, the cars are dumped into a hopper, and the ore is fed to the jaw crusher by a vibrating grizzly. Sized material is loaded in a storage pocket. The sub level drifts, raises, and scraper drifts are all located above the main haulage level and permit access to the ore bodies from which the ore is extracted.

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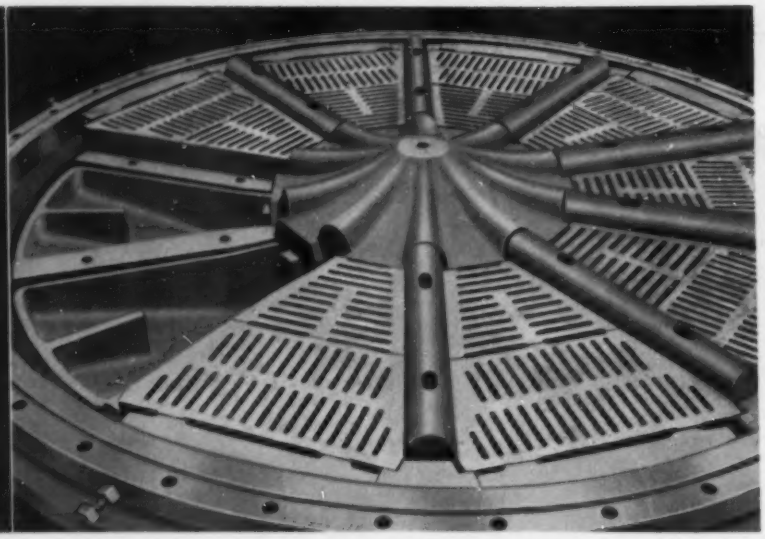

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DMEA Reports Progress With Northwest Projects

Pacific Northwest exploration programs, into which the Defense Minerals Exploration Administration has put $4,640,558 so far, have turned up ore reserves valued at $87,000,000. Although some of the larger discoveries have not yet come into production, the DMEA already has been paid back nearly $250,000 under a long-tern royalty repayment program.

The government agency has granted 184 exploration contracts out of 571 applications for assistance. These provide for exploration work costing $14,336,382, of which the DMEA's share would be $8,169,562. Up to January 1, 132 contracts, calling for $5,911,568 in expenditures, had been completed or otherwise terminated.

About 19 percent of the projects have been in major mining districts, 30 percent in minor districts, 15 percent in isolated mines, and 36 percent at isolated prospects. There have been 42 percent hits and 42 percent misses in the major districts, 30 percent hits and 60 percent failures in minor districts, and 25 percent hits and 65 percent failures outside of recognized districts.

A sea-level exploration tunnel in property of *Rainbow Mining and Milling Company* west of Wallace, Shoshone County, Idaho, is nearing the downward projection of the Rainbow vein in the hanging wall of the Polaris fault. The Rainbow company is controlled by *Coeur d'Alene Mines Corporation. Polaris Mining Company* is doing the work under a profit-sharing agreement.

Development work by *Clayton Silver Mines* in Custer County, Idaho's Bay Horse district has proven that the big North ore body extends to the new 550-foot level. About 170 feet of additional stoping ground is indicated overhead. Values are in lead, silver, and zinc. A tetrahedrite-bearing vein was discovered in developing the new level but its extent has not been determined. W. M. Yeaman of Yakima, Washington is president, and Norman M. Smith is general manager.

Sunshine Mining Company is deepening two compartments of its four-compartment Jewell shaft in Shoshone County, Idaho's silver belt. They will be excavated from the present 3,840-foot sump level to the 4,050-foot level. A new 4,000 level then will be established to get additional depth on the Silver Syndicate West Rambo ore body, estimated to lie about 250 feet north of the shaft. A Riddell clam-shell mucker is being used. Sunshine has moved its general office from the Sunshine mine to the Peyton Building in Spokane, home of the firm's exploration division. Both Robert M. Hardy Jr., president, and Ross D. Leisk, vice president and general manager, now make their homes in Spokane.

Replacement of a compressor house and machinery destroyed in a $10,000 fire at the *Empire* copper property near Mackay, Idaho is planned by *Idaho Alta Metals Corporation*. The blaze has prevented development of the 1,100-level ore body reached a few days before the fire. Roland Hunter is superintendent.

Steady progress is being made by *Silver Star-Queens Mines, Inc.* in developing its properties near Bellevue, Blaine County, Idaho. At last report, 10 men were employed in sinking on the Queen footwall vein from the 450 level and in diamond drilling the Minnie Moore vein. R. T. Fitz is manager.

The old *Copper Camp* properties near Big Creek, 23 miles north of Stibnite, Valley County, Idaho, have been leased by *Highland-Surprise Consolidated Mining Company* of Wallace. Tentative plans include extension of an old 600-foot tunnel which failed to reach its objective. The company also plans additional diamond drilling to probe for ore extensions at its *Deer Trail* zinc-lead property in Custer County. Exploration work since last August reportedly developed about 125,000 tons of ore. *Sunshine Mining Company*, big Shoshone County operator, is a partner in the venture. Tibor Klobusicky is superintendent in charge.

Vulcan Silver-Lead Corporation has acquired the large adjoining holdings of *Vulcan Extension, Inc.*, a subsidiary of *Callahan Zinc-Lead Company*, west of Wallace, Shoshone County, Idaho, on the basis of one share of stock for each 20 shares of Vulcan Extension held. Vulcan Silver-Lead's *Galena* mine is operated by *American Smelting and Refining Company* under a lease arrangement.

In Idaho's Lakeview mining district at the southern end of Lake Pend Oreille, *New Rainbow Mining Company* has intersected a silver-bearing structure in the western part of the old *Weber* mine. The company has made small shipments from the reopened eastern part of the mine. Robert B. Austin of Wallace is president and manager.

Tom Peck of Carey, Idaho, has taken a lease and $100,000 purchase option on the old *River Queen* copper mine in the Seven Devils area. Plans call for treating the Snake River Canyon mine ore with a new leaching process. Machinery, including stainless steel vats, has been moved onto the property.

Golden Ridge Uranium Company has been incorporated at Idaho Falls, Idaho for $200,000. Karl M. Pratt of Salt Lake City, Orland Higginbotham of Idaho Falls, George A. Peterson and James C. Christensen of Blackfoot, and Herbert Boke of Preston are the incorporators.

Anaconda Company will spend $36,000,000 in expanding its Butte, Montana operations. (See MINING WORLD, May 1956, page 87.) Expenditures will include $20,000,000 on the Ryan shaft in preparation for mining of copper-zinc ores from a new area; $7,000,000 for equipment at the *Berkeley* open-pit operation, and $9,000,000 for mill and smelter changes at Anaconda and for railroad rolling stock for the Butte, Anaconda & Pacific Railway. The work is expected to add 2,500 men to payrolls by the end of 1960 and to increase Butte's population by more than 10,000.

Western Resources, Inc. has resumed prospecting work at its uranium prospect near Saltese, Mineral County, Montana following a winter shutdown. J. Fred Williams, Jr., former head of the Washington State College school of mines' metallurgical department, has been hired as consulting engineer. Wellman Clark of Spokane, is president.

U & W Uranium, Inc. has been trucking copper ore from its *Whaley* lease near Missoula, Montana to a Victor loading dock for rail shipment to the Tacoma smelter. Bulldozer mining operations were started in March. Thomas J. Linton, Spokane, is president.

Development of a tungsten deposit near Libby, Montana is planned by the newly incorporated *Moose Hill Mining Company* of Spokane, Washington. The firm has a 25-year lease on the *Waylett* group of 10 claims staked in 1953 by Libby and Sandpoint prospectors. Organizers of the firm bulldozed an access road last fall and bored nine shallow diamond drill holes which showed an eight-foot vein of scheelite. Additional drilling is scheduled to determine if mill construction is justified. Kenneth B. Morlan, Spokane, is president, and Jack Blodgett, Spokane, secretary-treasurer.

NOTICE TO CLAIM HOLDERS

Public Law 167 amended the mining laws and became effective July 23, 1955. Among other provisions called for is determination of the status of claim locations, particularly in regard to surface rights and uses no matter when located. Already the Forest Service, with increased congressional appropriations, is starting to check all claims. Called to MINING WORLD's attention are claims determinations in California, New Mexico, Idaho, Oregon, and Washington.

The best thing that a claim owner, or anyone having any interest in a claim, can do to protect his interest and determine what the government is doing about claims in his area is to **file a "request for notice" in the county office where claims are recorded.**

This "request for notice" should give the following: Name and address of the person requesting copies. Date of claim location. Book and page where location certificate is filed. Location of the claim by section, where possible, or the tie to approved United States mineral monument.

To start determinations, the government must only publish a notice in the local newspaper. However, if a claim holder has filed a "request for notice," the government must also notify the claim holder individually.

In either case, whether or not a request for notice has been filed, the claim owners MUST FILE A VERIFIED STATEMENT within 150 days after first publication. File statement with office specified in published notice.

Minerals Engineering Company will cut its output from its Glen, Montana tungsten mill by half because of the government's cancellation of the tungsten stockpiling program. Also affected has been the production from the company's refinery at Salt Lake City, Utah.

Wenona Uranium Company has been incorporated by O. E. Wendt and Gladys Pfrimmer of Columbia Falls, Montana; Louis M. Cestnik, Joseph J. Mgrich, and A. E. Henderson of Martin City; Frank P. McCarty of Kalispell; and A. H. Humphrey of Coram.

William C. Woodard of Missoula, Montana, and J. E. Edens and J. W. Rukgaber of Darby, have incorporated *Uranium Ventures Corporation*.

A mining development company, *Lidberg-Shaw, Inc.*, has been incorporated by Oscar Lidberg of Thompson Falls, Montana, and Denton and Pauline Shaw of Great Falls.

OREGON

Comstock Uranium-Tungsten Company, Inc. was the first 1956 chromite shipper from Oregon's John Day region. The firm is currently operating the *Haggard and New* mine in Grant County. About a mile northwest of this operation, Al Dunn is reported to have started construction of a mill at Canyon City. This would be to treat chromite ore from a leased prospect on the William Gardner ranch.

Hanna Nickel Smelting Company completed its first full year of commercial operation at Riddle, Oregon in 1955 with a production of 390,000 tons of ore and 15,000,000 pounds of ferronickel which contained 6,500,000 pounds of nickel. Large quantities of ferrosilicon were also produced for use in the ferro-nickel smelting process. Two electric furnaces were in operation during 1955 and two others are scheduled for production in 1956.

WASHINGTON

Lucky Scarlett Uranium Mining and Development Company has increased its holdings in northeastern Washington to more than 11,000 acres. Latest acquisition was a 640-acre lease near Tum Tum, northwest of Spokane. At last report, prospecting was under way on this property and work was planned along an iron-limestone contact zone about two miles west of Enterprise and just north of the Spokane Indian Reservation, in southwestern Stevens County. Theodore Mantz of Plaza is president, and Howard Tomlinson, Spokane, secretary-treasurer.

At the *Van Stone* zinc-lead mine near Northport, Stevens County, Washington, *American Smelting and Refining Company* has shifted open-pit operations to both the big North ore body and the smaller South ore body. Ore has been mined from the North pit since operations were started in 1952. Production is continuing at a capacity 30,000 tons of ore monthly. About 80 men are employed, half in ASARCO'S modern flotation plant and the remainder by *Isbell Construction Company* of Reno, Nevada, the mining contractor.

Pend Oreille Mines & Metals Company will become the largest ore producer in Washington and Idaho if it carries through plans to increase production 50 percent this year at its Metaline district (Washington) zinc-lead mine. Its 1955 output was 503,391 tons. Underground mining operations have been stepped up from a five-day to a six-day-week basis and milling operations from six days to seven days a week. The 1956 development program includes extending the incline shaft 2,500 feet, 2,000 feet of drifting, and 20,000 feet of rotary drilling in the area north of present mining operations. Jens Jensen, Spokane, is company president.

Stardust, Inc. has started a percussion drilling program on a 480-acre lease in the Mount Spokane district, northern Spokane County, Washington. The lease is two miles south of the producing *Daybreak* mine. Stardust formerly operated as the *Mitchell Mining and Development Company* of Wenatchee, Washington. C. O. Mitchell is president and R. G. Shimanski, Spokane, secretary-treasurer.

A broken water flume line forced a 10-day shutdown of operations of *American Zinc, Lead and Smelting Company* at its *Grandview* mine lease near Metaline Falls, northern Pend Oreille

County, Washington. The flume is owned by *Lehigh Portland Cement Company*. American Zinc installed a pumping system on Sullivan Creek. John W. Currie is resident mine manager.

Granore Company, United States subsidiary of *Granby Consolidated Mining, Smelting and Power Co., Ltd.* of Copper Mountain, British Columbia, has carried out a drilling program at the *Lone Star* claims in Ferry County, Washington, near the Canadian border. About 400,000 tons of 1 percent copper ore has been established for open-pit mining and about 200,000 tons of higher grade ore for underground mining.

Bear Creek Mining Company is preparing for another summer's exploration at the Snohomish County, Washington property of *Glacier Peak Mining and Smelting Company* high in the Cascade Mountains. Results of test drilling to date have shown encouraging copper values. The work has been under supervision of Lowell B. Moon, geologist in charge of the firm's Northwest district office in Spokane. *Kennecott Copper Corporation* is the parent company.

Adding to its holdings in northern Spokane County, Washington, *National Uranium Corporation* of Idaho has leased the 80-acre *Vigue* ranch and at last report was starting to explore an autunite showing found by the owner. The tract is 1⅛ miles north of the *Stapleton* ranch lease where the firm is doing underground exploration work. John B. Platts of Wallace, Idaho, geologist, is directing the work.

Dahl Uranium Mine, Inc. has resumed test drilling of its Spokane Indian Reservation holdings with a new $16,000 truck-mounted percussion rig equipped with gyroflow compressor and three-inch bit. Caving trouble caused a suspension of drilling until a high spring water table returned to near normal. Frank Wilson of Spokane is stockpiling autunite ore for the company under a 50-50 profit-sharing contract covering the original company autunite discovery on the 140-acre *Dahl* lease in the Mount Spokane district of Washington. William D. Weaver of Spokane is company mining consultant.

Big Smoke Uranium, Inc. is the second uranium firm to be granted a lease from the U.S. Department of the Interior on land in the Spokane Indian Reservation, southwestern Stevens County, Washington. The 160-acre lease covers ground near the Spokane River where the firm found uraninite while prospecting under an assignment of a prospecting permit from a member of the Spokane Indian Tribe. Ore is being stockpiled from an open-pit operation in preparation for shipments. Drilling to date has added to ore reserves. The firm also has leased 120 acres of allotted land in the reservation with the object of making shipments from a large outcropping of high-grade silica. William O. Kumbera, Spokane, is president.

V. E. Lovejoy and Dan Robinson of Chewelah, Washington, have staked *Wildcat Uranium* claims 1 to 10 in the Chewelah mining district, Stevens County.

General Uranium, Inc., a new Spokane firm, has taken assignments on two prospecting permits on the Spokane Indian Reservation, southwestern Stevens County, Washington, and is negotiating for other properties, including land in the Mount Spokane district. The company is headed by James L. Simpson, Coeur d'Alene, Idaho, co-owner of *S & S Enterprises*, aerial exploration and equipment firm. Edward F. Harris is vice president and Donald A. Ericson, Spokane attorney, is secretary.

Highnoon Uranium Mines, Inc. has scheduled development work at two Pend Oreille County properties on which it has found specimens of uranium. The sites are near Diamond Lake and on Ruby Creek, west of Blue Slide, Washington. The firm also plans to continue the extensive prospecting operations it started last year. Charles A. Pulford of Newport is secretary-treasurer, and C. N. McJunkin of Hermiston, Oregon is president.

Development of five leases in the Mount Spokane uranium district of northern Spokane County, Washington is planned by *Inland Empire Mining Company* under a joint venture agreement with *Tungsten Uranium Mines, Inc.* The properties are south of the *Daybreak* uranium mine. Test drilling has been started on one of them. Herbert L. Miller, Jr. of Spokane is president.

The old *Crystal* lead-silver mine, located in 1895 near old Fort Spokane in northern Lincoln County, Washington, is the scene of a new operation by a new Spokane firm. *Crystal City Mining Company* is exploring tungsten showings and proposes to unwater and rehabilitate the old lead-silver workings, which include a 181-foot shaft. The mine was developed by *New Crystal Mining Company* prior to World War I and later operated by *Lincoln Mining and Milling Company*. It was closed in the early 1930's. Luke C. Williams is company president and A. E. Warsinske, vice president.

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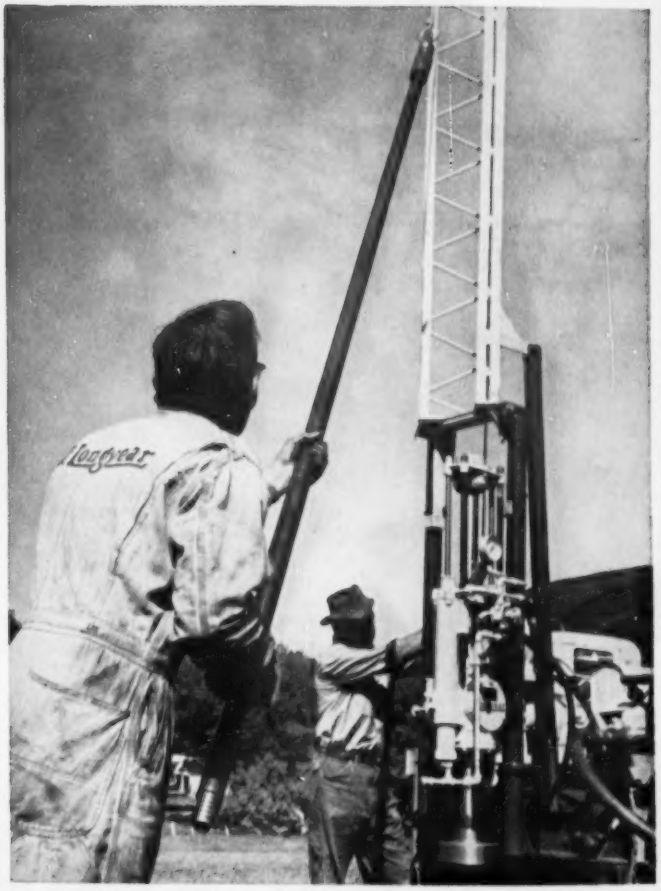

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